NATURAL HISTORY
OF
BRITISH BUTTERFLIES.

BY

EDWARD NEWMAN, F.L.S., F.Z.S.

BRITISH BUTTERFLIES.

LONDON:
PRINTED BY BANKEN AND CO., DRURY HOUSE
ST. MARY-LE-STRAND.

AN

ILLUSTRATED NATURAL HISTORY

OF

BRITISH BUTTERFLIES.

BY

EDWARD NEWMAN, F.L.S. F.Z.S.

&c. &c.

THE FIGURES

DRAWN BY GEORGE WILLIS,

AND

ENGRAVED BY JOHN KIRCHNER.

PYRAMEIS HUNTERA.

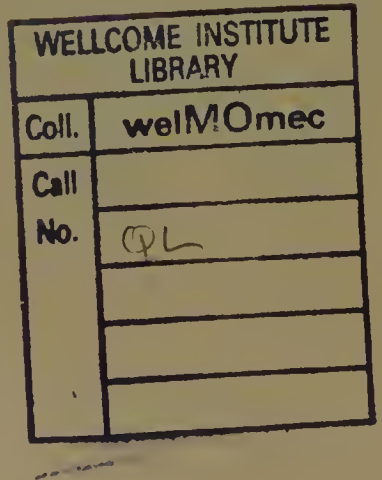
LONDON:

ROBERT HARDWICKE, 192, PICCADILLY.

MDCCCLXXIV.

"Nothing can be more ungrateful than to pass over the works of God without consideration. To study them is among the highest gratifications the human mind can enjoy. . . . . The book of Nature is open to us all: on every leaf 'Creator, God,' is written. Let us, then, daily employ some of those intervals of leisure which all may command, in examining those objects which fall under our immediate observation."

MRS. TRIMMER.



PREFACE.

My work is completed. I am bound to commend it to the "benevolent reader" in the good old-fashioned, time-honoured style. Fettered by usage, equally old-fashioned, equally time-honoured, I am induced to place this commendation in front, although I entirely agree with the sentiment that has induced some writers truthfully to place their preface as written, at the end, when all the rest was complete. This act of authorship is generally regarded as facetious—a very mild joke certainly, but a joke nevertheless. I cannot understand this: I cannot perceive why an author should be ashamed or afraid to make the public confession that his valedictory address was given forth after his long companionship with the reader had ceased. I cannot conceive why such an obvious truism should be thought droll. Be this as it may, one thing is certain: an author is held to be something less than courteous who does not commend his labours to the public in some way or other, even though he may have nothing to say by way of commendation: so I bow to custom and commence my task. Would that I could adopt the stereo-form of prefaces, and plead the pressing solicitations of a large circle of admiring friends as the lever that enforced publication; but I feel that such a plea would be untruthful. I have been submitted to no such pressure: I have been lifted out of my normal obscurity by no such lever. Friends such as these have held aloof in the coolest and most unconcerned manner. I am left without excuse.

First, then, I would invite attention to the fact, again noticed farther on, that I had a very, very early predilection for Butterflies—I may say even from my nurse's arms—and this taste having continued to old age, and having been indulged whenever opportunity offered, I have seen more of the little world of English Butterflies than most of my compatriots. I have become familiar with Silvery Queens and High Browns; have chased Dark Greens on the treacherous slopes of Cwm Elan; have revelled and rioted amongst thousands of Glanvilles on the Undercliff, where that admirable and determined squatter not only established itself in prehistoric times, but maintains its ground, and multiplies exceedingly; I have made the White C my especial game; I have taken *Io* from her favourite thistles and teasels, have watched the Purple Emperor soaring above the oaks at Darent, and have wondered why he should seek realms unknown to his lady-love, his empress-queen; and I have wondered still more why a creature so gloriously refulgent with purple, should condescend to feed on filth and putrefaction, instead of feasting on ambrosial pollen and quaffing nectar, with Flora for his cup-bearer; I have chased *Acis* with unusual success, and have mourned over his departure from the ancient dwelling-place where

Galathæa, his deserted love, still lingers, clothed in her widow's weeds; but of all the tribe of flying flowers—

"It flies, and seems a flower that floats on air,"

as saith Philip de Commine—Dian's nymph, *Hyale*, has led me the merriest dance among the blooming lucerne: it was where the Croydon rail now intersects those Surrey hills which constitute the first glimpse of country as we emerge from the fuliginous sea of London habitations: it was here, in market-gardens forbidden to the public, that I made her acquaintance. Here were employed a multitude of female Hibernians in the healthful pursuit of horticulture. On one occasion my quarry led me into their midst, when lo! they abandoned their occupation, and pursued me with the very same energy that I was wasting on the yellow-robed nymph; the scene must have been an exciting one, and would have reminded a classical spectator of Meleager, or Orestes, or Œdipus pursued by the Furies: alas! the resemblance to Œdipus is greater now!

It may be reasonably required that one so practised in these "pursuits" should impart to others some of the knowledge which he must himself have acquired in this branch of the gentle art of venerie, especially as regards the acquisition of extreme rarities: I can only regret that I have so little to impart. There are three modes in which rarities may be obtained:—*First*, by accident; the most careless and unobservant of beginners may receive an unexpected visit from *Antiopa* or *Lathonia;* the stranger may settle in his father's garden, and gladden his eyes without any reason, without any plausible excuse, and *may* fall a victim to the most bungling manipulation of that clumsy implement, the ordinary chimney-pot covering to which Englishmen cling as a respectable and becoming head-gear. *Secondly*, by diligently studying the localities; *Cinxia* is to be found with certainty on the Undercliff, *Epiphron* on the mountain wilds of Cumberland, *Typhon* on the mosses of Lancashire, *Arion* on the sedgy slopes of Devon and the Cotswolds, *Artaxerxes* on Arthur's Seat, and so with many others. *Thirdly*, by purchase; *Lathonia*, *Niobe*, *Antiopa*, *Daplidice* are to be purchased in abundance at 1d., 2d., or 3d. each, neither species being uncommon on the Continent: supposing the purchaser to be fastidious as to his collection being purely British, he may obtain a warranty with any individual specimen he is selecting, by paying twenty or thirty shillings additional: the specimen then becomes "British," just as a wealthy tradesman becomes an esquire by paying for armorial bearings which some ingenious manufacturer professes to "find" in the Heralds' College. I prefer dispensing with warranty as too expensive a luxury; and although I admit the truth of Butler's familiar couplet, showing that

"*Some say* the pleasure is as great
In being cheated as to cheat,"

still the pursuit of pleasure, however keen, must stop somewhere, and with me

it has always stopped short of purchasing a British *Lathonia;* and I emphatically recommend all beginners either to procure European specimens for *pence*, and mark them carefully as foreign, or wait patiently for the chance advent of a British specimen. All scholars will recollect the interdict laid by Juno on Latona—an interdict that seems to be still rigidly enforced on British soil: she has no resting-place here. As applicable to this branch of my subject, I may perhaps be allowed to introduce the profound and truthful observation that "angels' visits are few and far between"; this observation may or may not be original: I am not altogether free from an impression that I have seen it in print. But this is exactly the case with *Lathonia's* visits, and also with those of *Antiopa.* The Queen of Amazons will favour us now and then, but always without rule and without notice: nothing can be more capricious than her conduct. She will sometimes vouchsafe an appearance on a heaven-kissing hill, sometimes on a desert plain; sometimes she will settle in one of those roadways which intersect the thickest forestry; sometimes she may be seen basking on the cossus-eaten trunk of a pollard willow overhanging a river's brim; sometimes even in a walled garden, imbibing the luscious juices of a fallen plum; but always regardless of degrees of latitude or longitude, or the laws of altitude, or the conditions of atmosphere and soil: to these she has never acknowledged fealty or declared herself amenable.

Need I give any instruction how to catch the common Butterflies? In France, in Switzerland, almost every educated boy or girl is far more accomplished in this art than I: their instrument is simply a bag of green muslin or gauze thirty inches deep, twelve inches wide on the top, and tapering almost to a point at the bottom; round the top there must be a hem of brown holland, and a cane or wire in the form of a ring must be run through the hem and form a hoop, the lighter the better: the hoop must then be fastened by means of a ferule, or a screw, or any other simple contrivance, to the top of a walking-stick, and then the implement is complete. Such a net can be bought at any shop in London where insects are sold; for instance, at Ashmead's in Bishopsgate Street, Gardener's in Holborn, Cooke's in New Oxford Street, and a great many others; the same tradesmen will also supply you with suitable pins to pin your Butterflies, and with pocket boxes in which to place them when pinned. I cannot strongly recommend articles that are made rather for sale than for use; but it is necessary to buy in the first instance, and very soon you will get into the way of making the apparatus for yourself, and making it to your own taste and of durable materials. It is very difficult to lay down any rule on the subject of making nets, so I give this advice to purchase in the first instance, that you may gain a preliminary idea of what to use; practice and experience will teach you everything in the course of a few months, and there are no lessons so good or so perfectly remembered as those which practice and experience teach.

But there is another and a better way to obtain Butterflies. I have fully explained, in the Introduction which follows, that a Butterfly was not always a Butterfly, but was

"Once a worm, a thing that crept
On the bare earth, then wrought a tomb and slept."

In this state of worm or caterpillar, Butterflies of many kinds are most easy to obtain: to my notion, an umbrella and a walking-stick are the best implements. Spread the umbrella; turn it upside down; hold it under a shrub, a bunch of nettles, or the bough of a tree; thrash the foliage with your walking-stick, and caterpillars without number will fall into the umbrella: pick them up, put them in tin boxes, and take them home. They will not all produce Butterflies; many of them moths; but whether caterpillars of moths or Butterflies, they are all worth keeping. "Caterpillars being mostly eaters of vegetable matter, there is no difficulty in providing and renewing the plants upon which they feed. A garden pot, half filled with loose, sandy earth, with a few pieces of cane bent over, and the ends inserted in the pot; this frame covered with gauze, and a string passed over it below the mouth of the pot, forms a very good cage for caterpillars. A slip of the food-plant should be first placed in a phial of water and put in the centre of the cage, which should be kept in a shady place. According to the size of the caterpillars, and the heat of the weather, the food will require to be renewed from time to time." These instructions are copied from the "World of Insects, by J. W. Douglas," and others, more minute, elaborate and complete, will be found in that excellent little book, "The Insect-Hunter's Companion," by the Rev. Joseph Greene. I would most willingly quote pages from this last-named work, which is published by Mr. Van Voorst at 1s. 6d.; but I imagine that every collector of insects must of necessity purchase the book itself, and it would be useless to possess the same information in two forms.

Treated in accordance with Mr. Greene's instructions, and carefully watched from time to time, the caterpillar will soon grow to its full size, will fix itself to the pot, the muslin, the leaves, or the twigs, and then turn to a chrysalis, and subsequently to a Butterfly, in the manner which I have fully described at page 14.

There is another very curious circumstance which attends the birth of a Butterfly —a circumstance that has been noticed by all naturalists and in all ages. This is so well described in that inimitable work, Kirby and Spence's "Introduction to Entomology," that I shall quote their description as being better than anything I can write myself:—

"Many species of Butterflies, when they emerge from the chrysalis state, discharge a reddish fluid, which in some instances, where their numbers have been considerable, has produced the appearance of a shower of blood; and by this natural fact, all those bloody showers recorded by historians as preternatural, and regarded where

they happened as fearful prognostics of impending evils, are stripped of their terrors, and reduced to the class of events that happen in the common course of nature. That insects are the cause of these showers is no recent discovery, for Sleidan relates that in the year 1553 a vast multitude of Butterflies swarmed through a great part of Germany, and sprinkled plants, leaves, buildings, clothes and men, with bloody drops, as if it had rained blood. But the most interesting account of an event of this kind is given by Reaumur, from whom we learn that in the beginning of July, 1608, the suburbs of Aix, and a considerable extent of country round it, were covered with what appeared to be a shower of blood. We may conceive the amazement and stupor of the populace upon such a discovery, the alarm of the citizens, the grave reasonings of the learned. All agreed, however, in attributing this appearance to the powers of darkness, and in regarding it as the prognostic and precursor of some direful misfortune about to befall them. Fear and prejudice would have taken deep root upon this occasion, and might have produced fatal effects upon some weak minds, had not Mr. Peiresc, a celebrated philosopher of that place, paid attention to insects. A chrysalis which he preserved in his cabinet let him into the secret of this mysterious shower. Hearing a fluttering, which informed him his insect was arrived at its perfect state, he opened the box in which he kept it. The animal flew out, and left behind it a red spot. He compared this with the spots of the bloody shower, and found they were alike. At the same time he observed there was a prodigious quantity of Butterflies flying about, and that the drops of the miraculous rain were not to be found upon the tiles, nor even upon the upper surface of the stones, but chiefly in cavities and places where rain could not easily come. Thus did this judicious observer dispel the ignorant fears and terror which a natural phenomenon had caused."

To return to my more immediate subject. Having now obtained your Butterfly, you must proceed to kill it for preservation, unless indeed you find it is one you already possess, and then, by all manner of means, allow it to escape. It will indeed be a pleasure to see your captive essay the powers of his newly-acquired wings, and launch himself for the first time on "the realms of air." But suppose you wish to preserve it, then, alas! it must die. Butterflies require to be pinned: the pin is passed through the very centre of the thorax, or that part to which the wings are attached, the finger and thumb of the left hand at the same time pinching the insect under the wings. A slight pinch numbs a Butterfly; and immediately it is pinned it must be put in the collecting box, in which a little bag of camphor or of chopped laurel leaves must always be kept. The object of this is to prevent the return of life, for, curious as it may seem, a Butterfly, after appearing to be dead, will frequently be seen to move, and this for hours. Now, it is not only cruel to keep any living thing in such a semi-animate condition, but it is very unwise, for it will be sure to

injure itself by knocking off the delicate scales with which its wings are adorned. In the second volume of the "Entomological Magazine" the late Mr. Stephens gives some excellent instruction as to the manner of using the laurel leaves. It is as follows:—"Take three or four juicy leaves, the younger the better, with, if a more powerful effect is required, a small portion of the tip of the stalk of the common laurel, break or cut them into small pieces, and crush them quickly between two stones, in a thin piece of paper, screw up the produce in the latter, with as little exposure to the air as can be managed, and fix the mass by a pin in the corner of the collecting box, in which the living insects are to be previously placed; keep the box closely shut, and in about five minutes every specimen will have expired. It is necessary that the external air should be excluded, otherwise the fumes of prussic acid which are evolved from the crushed leaves will become too much attenuated to affect the respiratory organs of the insects, and the latter will partially revive if too speedily exposed to the vivifying influence of a purer atmosphere."

Now, then, your Butterflies being caught and killed, the next process is to "set" them, by which I mean to place them in the position in which they are to remain. For the purpose of "setting" insects, corked boards are prepared and sold by hundreds, and may be obtained of the dealers already mentioned. These boards have grooves in them of a variety of sizes adapted to admit the body of any Butterfly or moth; the body being placed in this groove, the wings have to be strapped down with card. You must cut a common card—any visitor's or tradesman's card will answer the purpose—in little strips; lay one of the strips on the two wings on one side of the Butterfly, and another strip on the two wings on the other side, and pinning down the ends of both strips, the wings will remain exactly in the position in which you place them. A word as to that position: let the wings be so arranged that the markings on all four wings shall be distinctly visible. You can have no better rule on this subject than to imitate exactly the position in which Mr. Willis has placed them in the beautiful figures he has drawn to illustrate this history. If you only continue to follow carefully the positions he has drawn, you will succeed to admiration. Arrange your setting-boards in what is called a drying cage—that is, a box with grooves along the sides in which the setting-boards can slide easily. There must be a window of perforated zinc or gauze wire at both ends of this drying cage, so that the air may pass freely through, whilst the mice, cockroaches, and wasps are kept out. Woe to the Butterfly that is attacked by either of these enemies! It is curious that three animals, that are not very likely to eat Butterflies and moths in a state of nature, should prefer them, when the entomologist has prepared them for his cabinet, to every other kind of food, however delicious. I call it a depraved taste; depraved, indeed, it certainly is, for how can these

creatures reconcile this conduct with the laws of morality and honesty? But even for that most detested of all creatures, the cockroach, I can add a word of praise. There is nothing new under the sun, so says the proverb. I believed, until a few years back, that I possessed the knowledge of a fact in the dietetic economy of the cockroach of which entomologists were not cognizant, but I find myself forestalled; the fact is as old as the hills; it is that the cockroach seeks with diligence, and devours with great gusto, the common bed-bug. I will not mention names, but I am so confident of the veracity of the narrator that I willingly take the entire responsibility. "Poverty makes one acquainted with strange bedfellows," and my informer bears willing testimony to the truth of the adage: he had not been prosperous, and had sought shelter in a London boarding-house: every night he saw cockroaches ascending his bed-curtains; every morning he complained to his very respectable landlady, and invariably received the comforting assurance that there was not a "black beetle" or a bug in the house, and if he *had* seen such a thing, he must have brought it to the house in his clothes: still he pursued his nocturnal investigations, and he not only saw cockroaches running along the tester of the bed, but, to his great astonishment, he positively observed one of them seize a bug, and he therefore concluded, and not without some show of reason, that the cockroaches ascended the curtains with this especial object, and that the minor and more odoriferous insect is a favourite food of the major one. The following extract from Webster's "Narrative of Foster's Voyage" corroborates this recent observation, and illustrates the proverb which I have taken as my text. "Cockroaches, those nuisances to ships, are plentiful at St. Helena; and yet, bad as they are, they are more endurable than bugs. Previous to our arrival here in the 'Chanticleer' we had suffered great inconvenience from the latter, but the cockroaches no sooner made their appearance than the bugs entirely disappeared; the fact is, that the cockroach preys on them, and leaves no sign or vestige of where they have been: so far it is a most valuable insect." Whether this "word for the cockroach" will reconcile housekeepers to its presence is doubtful; no one likes to acknowledge the existence in his house of "the minor and more odoriferous insect," and the axiom that "the greater includes the less" might here also prove true.

However, let us suppose that the Butterflies on the setting-boards have fairly escaped the mice, the wasps, and the cockroaches, and have thoroughly dried, and are quite fit to remove—I recommend that they be left at least ten days—then comes the question, the very important question, of what to do with them. Of course, they must be removed to a cabinet, about which I have a good deal to say. A well-made cabinet is of the greatest importance, and is not to be obtained without some difficulty and expense. Every cabinet-maker will at once take your order; but an habitual tradesman-like acumen will prevent his doing

you justice. Many parts of the cabinet are not visible from the exterior, and it is almost impossible to persuade a tradesman to use good and seasoned wood for those parts which are not exposed to sight. It is therefore absolutely necessary to inspect the work while in progress, to examine the wood, and ascertain that it is thoroughly seasoned; if the wood retains any sap it is of no use, as it invariably warps, and thus prevents the drawers from moving, and the cabinet becomes useless. Nothing but the best mahogany must be used: a great variety of wood has been tried, particularly a kind of resinous cedar, which has a colour and a grain much resembling mahogany, but which is far worse for cabinets than the most resinous deal; after the cabinet has been a short time built, it will become saturated with resin, and all the insects it contains will be speedily spoiled. Other cheap woods are also much in use, and are vencered in front with mahogany, and the parts which are exposed on taking out a drawer, are smeared over with a brownish composition, to keep up the deception. A cabinet should consist of two tiers of drawers, fifteen or twenty in each tier: if the number be fifteen only, there is abundance of room for a book-case to stand above them, which is not only convenient, but has an agreeable effect. The drawers should be enclosed in front by folding doors, all the edges of which must be carefully covered with velvet; by this precaution dust is effectually excluded. Each drawer should be from fifteen to eighteen inches square and two inches deep, and should be covered with thin slices of very soft cork; these slices are glued together at the edges, and fastened to the bottom of the drawer by small tacks and glue, the tacks, or rather brads, being without heads. When the cork is secured, its surface must be made perfectly smooth, by rubbing it with pumice-stone, and the whole is then neatly covered with white paper, the paper being pasted on the cork. It will be found that the cork permits the pin on which an insect is placed to pass into it with the greatest facility, and yet is sufficiently elastic to retain it steadily in its place. Each drawer must be covered by a pane of the best flatted glass, carefully fixed with putty in a square frame, and the frame nicely fitted to the drawer, thus insuring the exclusion of any dust that may have passed the folding doors.

A cabinet made on this plan is, of course, very expensive: it is out of the question to get a cheap one; the materials are dear, and the cost of putting them together is very great, and there are few, very few, cabinet-makers who understand it. I have seen the cabinets made by three only. The price of a cabinet thoroughly well made is a guinea a drawer: it is worth no man's while to make one for less. It seems, and indeed it is, a great deal of money, but the real test of the matter is, "Will anyone make it for less?" and it is a fact worthy of consideration that really well-made cabinets, when sold second-hand by Mr. J. C. Stevens, of King Street, realise the original cost, or very nearly so, and sometimes even more; so that a really good insect cabinet is something

like a safe investment of money, the interest being paid in the pleasure and profit the owner receives from studying the contents.

As soon as the cabinet is quite ready to receive the Butterflies, you must cut up a copy of Doubleday's "List of British Butterflies and Moths" very neatly with a pair of scissors, thus making a quantity of little labels. You will observe that every insect has two names, as *Argynnis Paphia*: the first name must be pinned above the insect, the second below, thus:

ARGYNNIS.

(The Butterfly comes in this space.)

PAPHIA.

Then follows the next Butterfly, with its scientific name above and below, then the next, and so on until the row is complete. One drawer will accommodate six or seven rows of Butterflies. It is a very common plan with entomologists to rule on the paper straight lines, either in pencil or ink, between the rows; the idea is that they serve as guides to the eye in keeping the rows perfectly parallel; but a collection, as the number of insects increases, has to be re-arranged every few years, and then these lines have to be rubbed out, or obliterated in some way—perhaps by papering the drawers anew. This, I found, caused a great deal of unnecessary trouble, and therefore I have entirely abandoned the plan, and now manage to dispense with lines altogether.

Even after all your insects are arranged in the neatest manner, and you fancy that everything is going on well, you will often find that you have included in your carefully-glazed drawers insects that you had no desire whatever to preserve. Their presence will be indicated by coarse dust beneath your choicest specimens, and you will often see holes made in the wings, and all manner of disfigurement and damage. The enemies are of three kinds—the caterpillar of a beetle called *Attagenus Pellio;* the caterpillar of the clothes-moth, *Tinea pseudo-spretella;* and a nimble little fellow, called *Atropos pulsatorius*. Their united depredations would very speedily reduce your collection to a mass of dust and fragments; but never let the mischief come to such a pass as that. Directly you observe any dust, however little, underneath an insect, take off the glass, and take out the infected individual; as soon as he is removed from the drawer, drop benzole on his back, drop after drop, until he is thoroughly saturated, and all his wings are rendered perfectly transparent. In this state remove him to the drying cage, and there let him remain until all the benzole has evaporated, and his colours have returned, bright and beautiful as ever. You may be sure the creatures that were devouring him are all dead, and you have nothing further to fear from them. My own drawers are looked at so frequently, and the benzole is applied so continually, that marauders of this kind never

venture to show even their noses amongst my treasures; and I should be almost as much astonished to find a living destroyer as a living Emperor Butterfly in one of my drawers.

And now it only remains for me to mention my obligation to those gentlemen who have given me such cordial and constant assistance during the progress of my little work through the press: to all of them I offer my most sincere thanks. I cannot mention each individual by name, for the list would include everyone known as a collector of our British Butterflies, but I will select them to whom I am more especially indebted: and first, my valued friend and constant adviser, Mr. Doubleday. Every page has passed under his eye, and now incorporates his invaluable corrections. The incalculable importance of this supervision everyone will admit. Next, Mr. Bond. This generous and well-known naturalist placed his entire collection at my disposal: he considered nothing too good or too valuable to entrust to my care; and thus I have been enabled to figure varieties which exist only in his magnificent collection. Mr. Dale has been indefatigable in supplying dates and localities: there is not a species of any variety but has received some addition to its history from the stores of his unequalled information. Mr. Birchall, with his accustomed kindness, has done all in his power to promote my undertaking.

These, our leading Lepidoptirists, men of European reputation, claim individual thanks. But it must not be supposed that I undervalue in the slightest degree those less distinguished, but no less kind and energetic workers, who have supplied me with caterpillars for description, and with county lists of localities where Butterflies are to be found. Without such assistance this work would not have been what it is; nor would it have attained, while in progress, a sale which I believe is without equal in any branch of science.

Erebia Ligea.

INDEX.

*** The primary divisions are printed in CAPITALS, the secondary divisions in SMALL CAPITALS, the names of the Butterflies, whether English or Latin, in Small Roman Letters, and the Titles of Chapters in *Small Italic Letters*.

Thecla Pruni, with the wings closed.

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Papilio Podalirius recorded as British by Haworth, but no British specimen is known.

PRELUDE OF MOTTOES.

Child of the sun, pursue thy rapturous flight,
Mingling with her thou lov'st, in fields of light;
And where the flowers of Paradise unfold,
Quaff fragrant nectar from their cups of gold.
There shall thy wings, rich as an evening sky,
Expand and shut with silent ecstasy.
Yet wert thou once a worm, a thing that crept
On the base earth, then wrought a tomb, and slept.
And such is man; soon from his cell of clay
To burst a seraph in the blaze of day.

Rogers.

Who loves not the gay butterfly, which flits
Before him in the ardent noon array'd
In crimson, azure, emerald, and gold;
With more magnificence upon his wing—
His little wing—than ever graced the robe
Gorgeous of royalty, is like the kine
That wanders 'mid the flowers that gem the mead,
Unconscious of their beauty.

Carrington.

Behold again, with saffron wing superb,
The giddy butterfly. Released at length
From his warm winter cell, he mounts on high,
No longer reptile, but endowed with plumes,
And through the blue air wanders; pert, alights,
And seems to sleep, but from the treacherous hand
Snatches his beauties suddenly away
And zigzag dances o'er the flowery dell.

Hurdis.

Late, as I wandered o'er a verdant meadow,
Loathsome and hairy creatures were devouring
Every leaf that tempted with its greenness,
Or by its fragrance.
Great was their toiling, earnest their contention,
Piercing their hunger, savage the dissension,
Selfish their striving, hideous their bearing,
Ugly their figure.
Next day I wandered to the verdant meadow;
Each worm was spinning for himself a mantle;
It was his grave-shroud; and I watched him closely
Wrap it around him.
Once more I wandered by the verdant meadow;
Each worm was bursting from his long confinement;
Each one was spreading to the sun's bright beaming,
Quivering pinions.
Hued like a rainbow, sparkling as a dewdrop,
Glittering as gold, and lively as a swallow,
Each left his grave-shroud, and in rapture winged him
Up to the heavens.
Oh! then, shall man, on earth condemned to trouble,
Toilsome existence, warfare with his kindred,
Build for himself his last cold habitation,
Doomed to remain there?
No! like these creatures, trouble, toil, and prison
Chequer his pathway to a bright hereafter
When he shall mount him to the happy regions
Made to receive him.

Anon.

Frail feeble sprites!—the children of a dream!
* * * * *
Like motes dependent in the sunny beam,
Living but in the sun's indulgent ken,
And when that light withdraws, withdrawing then;—
So do we flutter in the glance of youth
And fervid fancy,—and so perish when
The eye of faith grows aged.

Hood.

These be the pretty genii of the flowers,
Daintily fed with honey and pure dew.

Hood.

Their wings with azure, green, and purple gloss'd,
Studded with colour'd eyes, with gems embossed,
Inlaid with pearl, and marked with various stains
Of lively crimson through their dusky veins.—

Mrs. Barbauld.

Lo, the bright train their radiant wings unfold
With silver fringed, and freckled o'er with gold.
On the gay bosom of some fragrant flower,
They idly fluttering live their little hour;
Their life all pleasure, and their task all play,
All spring their age, and sunshine all their day.

Mrs. Barbauld.

As, rising on its purple wing,
The insect queen of Eastern spring
O'er emerald meadows of Kashmere
Invites the young pursuer near,
And leads him on from flower to flower
A weary chase and wasted hour;
Then leaves him, as it soars on high,
With panting heart and tearful eye.
* * * *
The lovely toy so fiercely sought
Has lost its charm by being caught,
For every touch that wooed its stay
Has brushed its brightest hues away.

Byron.

Voyez ce papillon échappé du tombeau,
Sa mort fut un sommeil, et sa tombe un berceau;
Il brise le fourreau qui l'échainait dans l'ombre;
Deux yeux paraient son front, et ses yeux sont sans nombre;
Il se tranait à peine, il part comme l'éclair;
Il rampait sur la terre, il voltige dans l'air.

De Lille.

Round about doth flie,
From bed to bed, from one to t'other border;
And take survey with curious busy eye,
Of every flower and herbe there set in order
Now this, now that, he tasteth tenderly,
Yet none of them he rudely doth disorder.
Ne with his feete their silken leaves deface
But pastures on the pleasures of each place.

And evermore, with most varietie
And change of sweetness (for all change is sweet),
He casts his glutton sense to satisfie
Now sucking of the sap of herbe most meet,
Or of the dew, which yet on them doth lie
Now in the same bathing his tender feet:
And then he percheth on some branch thereby,
To neatten him, and his moist wings to dry.

And whatso else of vertue good or ill
Grew in the garden, fetched from far away
Of every one he takes and tastes at will;
And on their pleasures greedily doth prey
That when he hath both plaied and fed at fill
In the warme sunne he doth himself embay,
And then him rests in riotous suffisaunce
Of all his gladfulness and kingly joyaunce.

What more felicitie can fall to creature
Than to enjoy delight with libertie
And to be lord of all the works of Nature?
To reign in the aire from the earth to highest skie,
To feed on flowers, and weedes of glorious feature!
To take whatever thing doth please the eye!
Who rests not pleased with such happiness
Well worthy he to taste of wretchedness.

SPENSER.

The helpless crawling caterpillar trace,
From the first period of his reptile race.
Cloth'd in dishonour, on the leafy spray
Unseen he wears his silent hours away;
Till satiate grown of all that life supplies,
Self-taught, the voluntary martyr dies.
Deep under earth his darkling course he bends.
And to the tomb, a willing guest, descends.
There, long secluded, in his lonely cell,
Forgets the sun, and bids the world farewell.
O'er the wide wastes the wintry tempests reign,
And driving snows usurp the frozen plain:
In vain the tempest beats, the whirlwind blows;
No storms can violate his grave's repose.
But when revolving months have won their way,
When smile the woods, and when the zephyrs play,
When laughs the vivid world in summer's bloom,
He bursts; and flies triumphant from the tomb;
And while his new-born beauties he displays,
With conscious joy his altered form surveys.
Mark, while he moves amid the sunny beam,
O'er his soft wings the varying lustres gleam.
Launched into air, on purple plumes he soars,
Gay nature's face with wanton glance explores;
Proud of his varying beauties wings his way,
And spoils the fairest flowers, himself more fair than they.

(*From*) HAWORTH.

Dipt in the richest tincture of the skies,
Where light disports in ever mingling dyes,
While every beam new transient colour flings,
Colours that change whene'er they wave their wings.

POPE.

THE BUTTERFLY'S BIRTHDAY.

When bursting forth to life and light,
The offspring of enraptured May,
The Butterfly on pinions bright,
Launched in full splendour on the day,

Unconscious of a mother's care,
No infant wretchedness she knew;
But as she felt the vernal air,
At once to full perfection grew.

Her slender form, ethereal light,
Her velvet textured wings infold;
With all the rainbow's colours bright
And dropt with spots of burnish'd gold.

Trembling with joy awhile she stood,
And felt the sun's enlivening ray;
Drank from the skies the vital flood,
And wondered at her plumage gay!

And balanced oft her broidered wings,
Through fields of air prepared to sail:
Then on her vent'rous journey springs,
And floats along the rising gale.

Go, child of pleasure, range the fields,
Taste all the joys that spring can give,
Partake what bounteous summer yields,
And live whilst yet 'tis thine to live.

Go sip the rose's fragrant dew,
The lily's honey'd cup explore,
From flower to flower the search renew,
And rifle all the woodbine's store:

And let me trace thy vagrant flight,
Thy moments, too, of short repose.
And mark thee then with fresh delight
Thy golden pinions ope and close.

But hark! while thus I musing stand,
Pours on the gale an airy note,
And breathing from a viewless hand
Soft silvery tones around me float!

They cease—but still a voice I hear,
A whispered voice of hope and joy,
"Thy hour of rest approaches near
Prepare thee, mortal—thou must die!

"Yet start not! on thy closing eyes
Another day shall still unfold,
A sun of milder radiance rise,
A happier age of joys untold.

"Shall the poor worm that shocks thy sight,
The humblest form in nature's train,
Thus rise in new born lustre bright,
And yet the emblem teach in vain?

"Ah! where were once her golden eyes
Her glittering wings of purple pride?
Concealed beneath a rude disguise,
A shapeless mass to earth allied.

"Like thee the hapless reptile lived,
Like thee he toiled, like thee he spun,
Like thine his closing hour arrived
His labour ceased, his web was done.

"And shalt thou, numbered with the dead,
No happier state of being know?
And shall no future morrow shed
On thee a beam of brighter glow?

"Is this the bound of power divine,
To animate an insect frame?
Or shall not He who moulded thine
Wake at his will the vital flame!

"Go mortal! in thy reptile state,
Enough to know to thee is given;
Go, and the joyful truth relate;
Frail child of earth! high heir of heaven!"

(*From*) KIRBY and SPENCE.

Vanessa C-album with its wings closed.

Pyrameis Atalanta, or Admiral; *a*, Caterpillar, *b*, Chrysalis, and *c*, perfect Butterfly.

INTRODUCTORY.

When I was a very little boy indeed—I will not say how long ago—I loved butterflies much better than books, and the teachings of Nature much better than the teachings of governesses, and I recollect, as well as if it were yesterday, the first butterfly I ever saw: it was sitting on a leaf, and I called out, "Oh, look what a beautiful flower!" and I tried to pick it, but away it flew; and I recollect that I cried out, "The beautiful flower has flown away." How lasting are early impressions! I have never forgotten that butterfly, and to this hour I cannot disconnect the idea of a butterfly and a flying flower. It was not, however, until I was about twelve years of age that I began seriously to think of writing a "History of Butterflies," which project was carried out some year or so afterwards, and the manuscript still exists. When, after the lapse of nearly half a century, I was requested to do the same thing for publication, all the names on which I had once doated, *Equites*, *Achivi*, *Parnassii*, *Danai*, *Nymphales*, and *Plebeii*, were either absolutely forgotten, or were curiously examined as though they were the fossil remains of some unknown world—more wonderful than this, the Greeks had become the wives of the Trojans, and, instead of contending with spears and swords, had settled their differences, and were ranged side by side in the drawers of every museum. A new arrangement and new views had superseded the old ones, and all my puerile labours had been rendered valueless; but I well recollect that Robert Southey, having been reproached with early writings, at variance with those of his more advanced years, bravely said, "I am no more ashamed of those writings than I am of having been a boy," and I fully enter into his feeling, and am no more ashamed of my first "History of Butterflies" than I am of having once been but twelve years of age. Neither can I imagine that we are even now approaching perfection, but quite anticipate that another generation will look down on my "*Detegentes*" "*Celantes*" "*Suspensi*" and "*Cingulati*" with

the same smile of placid superiority that I am now regarding the heroes of Troy and Greece. It is perfectly right that it should be so. What were the use of study if improvement were forbidden!

Every one now knows that a butterfly was not always a butterfly; probably every one then knew it, but there is little trace of that knowledge in the standard works of Linnæus and Fabricius, or in that of our own venerated Haworth. Every butterfly comes from an egg; from that egg emerges a caterpillar (*a*); that caterpillar sheds its skin some four, five, or half-a-dozen times, and then changes to a chrysalis (*b*); and in course of time that chrysalis bursts open and forthwith issues a butterfly (*c*). (See figure on preceding page.)

This seems a great mystery: and the learned in all ages—I mean, in all entomological ages—have availed themselves of the mystery as a plea for exhibiting their erudition, their profound knowledge: some of them demonstrate to their own entire satisfaction that the outer covering, or skin, has the power of evolving from its inner surface, a second skin, destined to take the place of the first, as soon as that is done with, and cast off; that this second skin evolves a third; this third a fourth, and so on until the last skin evolves a chrysalis, and the chrysalis a butterfly, with which event the power of evolution ceases, and the life of the individual is consummated and completed on its acquiring the new power of continuing its kind. Another set of philosophers contend that, from the very first, the egg contains all the parts and all the coverings of the future caterpillar, chrysalis, and butterfly; which last only awaits the escape from these in order to exhibit and enjoy its final and matured condition.

This view of the case is in accordance with my own theory: theory, you will please to remember, is an inference based on facts; it is perfectly distinct from hypothesis, an inference founded on conjecture. When I was very much younger I recollect being struck with an exhibition which may be a common one, but it is one I have only witnessed once: it was at a travelling circus, and at this strange place I saw an apt illustration of my theory of butterfly development. A horse was led into the circle carrying on its back what looked to me like a tar-barrel; at first the pace was very slow, but gradually increased. As the performance proceeded, the head of the barrel was forced out by some internal agency; then a head appeared, and then arms, and then the barrel fell to pieces, and a rough-looking countryman abundantly muffled up in coats stood on the horse's back; the whip was cracked, the pace quickened, and the rider threw off his upper coat; faster still, he threw off a second coat, a third, a fourth; faster and faster, more and more coats. He seemed to wear enough coats to stock an old clothes' shop, and to be very regardless of their value, as he threw them into the middle of the circle. The audience screamed with delight as the fun grew "fast and furious," until the rider appeared as an elegant female in short, pink, spangled skirt, a striking lack of clothing about the legs, and wearing a pair of glittering wings, possibly intended to resemble those of a butterfly. The pace slackened, the horse panted with the exertion, the audience applauded, and the lady bowed her thanks for the applause.

Now, just in the same manner as that elegant horsewoman must have been contained in the barrel and in the coats, so I suppose the butterfly to be confined in the egg, and the various skins or envelopes to have covered it from the very first, although perfectly concealed from human observation; the chief difference between the two being the gradual enlargement of the insect and the diminution of the rider: for as she cast off one garment after another, she seemed to "grow small by degrees and beautifully less"; whereas the butterfly after throwing off each of its garments seems to increase in size as though by natural expansion: with this exception the simile is perfect.

Such is the life-history of every butterfly; and if not a mystery or a miracle, it is still a history worthy the study of every rational being. How wonderful is the change of the same creature from a crawling caterpillar to a

soaring butterfly! I wish my readers to regard it as many of our poets and philosophers have done. The caterpillar, greedy, crawling, toiling for its very life, much resembles a man in his daily occupations; the chrysalis has no power to move, eat, or act in any way, and many actually bury themselves in the ground and there await the change to a butterfly, resembling man when dead and in his grave. Lastly comes the butterfly, bursting from its prison-house, and borne from place to place on beautiful wings. So is it appointed for the man who has walked uprightly on the earth, to rise from the tomb and ascend, a happy spirit, to regions of bliss. (See the prelude of mottoes with which I have prefaced these observations.)

Butterflies and moths together constitute a great and principal class of insects, which is called Scale Wings, or *Lepidoptera*, each individual possesses four wings, all of which are covered with scales.

I will now explain, as well as I am able, how to know a butterfly from a moth. In the first place, a butterfly always flies in the day time. In the second place, it always rests by night, and almost always in rainy or cloudy weather. In the third place, when it is resting, it raises its wings, in some instances, pressing them together back to back, so that the four wings look only like two wings, as shown at page 2 at the end of the mottoes: but a moth turns its wings downwards instead of upwards, folding them round its body. Again, the hind wings of a butterfly are stiff, and you cannot fold them up; but the hind wings of a moth are almost invariably neatly folded up lengthwise, and quite hidden beneath the fore wings. Then, again, both butterflies and moths have two feelers attached to the head, just in front of the eyes; we call them antennæ, and you will see them in every figure in the following pages. These in different insects are of different shapes; but in butterflies they generally have a little knob at the end. Then there is something else about the antennæ that is a still better guide to you than the knob at the end; and that is, that the owner cannot stow them away or hide them; whether the butterfly is asleep or awake, its antennæ are always stretched out in front, or held quite upright. Now a moth, when going to sleep, turns its antennæ under its wing, or conceals them in some similar manner, both from observation and from injury. Again, the eyes of a butterfly are very much larger than those of a moth, because the butterfly flies by day. The waist of a butterfly is nipped in, making the division into thorax and body very distinct; but there is no such distinct division in a moth: and hence the butterflies are called Pedunculated Lepidoptera (in science *Lepidoptera Pedunculata*), and the moths, Sessile-bodied Lepidoptera (in science *Lepidoptera Sessiliventres*). If you attend to all these differences, you will soon learn to distinguish at first sight an English butterfly from an English moth. No sooner, however, does the entomologist become acquainted with exotic butterflies and moths, than he finds exceptions and difficulties arise which scientific writers have rendered almost insuperable by the diversity of their opinions and the extreme skill with which they have been urged. On this subject it will be unavailing to enter here. It will be sufficient for me to say that the scientific are equally divided in opinion whether the insects belonging to the most magnificent order of sun-loving Lepidoptera—I mean the *Uranites*—should be regarded as butterflies or moths. My own opinion is decidedly in favour of considering them butterflies; but then it is an opinion only, so I will not urge it, but proceed to introduce a few general observations on butterfly life in its four different stages.

THE EGG STATE.

It is a most interesting occupation to watch the female depositing her eggs, and to observe the extraordinary sagacity she displays in selecting the leaf proper for the food of the future caterpillar. In a hedge or coppice, densely crowded with every kind of native shrub, the Emperor selects the sallow, the White Admiral the honeysuckle, and the

Brimstone the buckthorn. Hardly ever, by any chance, is the egg of one species laid on the food plant of another. There are, however, occasional exceptions; and these very exceptions display an amount of botanical knowledge which, of course, we must consider as instinctive or intuitive knowledge, possessed by these females, that cannot fail to excite our admiration; it is that when the usual food-plant is not at hand, and the egg must be extruded, the most nearly allied species is selected and made to serve as a substitute: for instance, when the common species of buckthorn (*Rhamnus catharticus*) cannot be found, the rarer species (*Rhamnus frangula*) is made to supply its place. When a female butterfly is about to lay her eggs, her conduct is totally different from that ordinarily to be observed: she assumes a grave, important, and business-like demeanour, with which the practical observer soon becomes familiar; she exhibits none of that volatility and carelessness which characterises a butterfly when engaged in the lighter labours of life, such as making love or sipping honey. Her eggs are generally covered with liquid glue at the moment they are laid, and this glue fastens them to whatever substances the parent butterfly pleases, generally the surface of a leaf, but sometimes to a twig or the bark of a tree. This latter plan is always adopted by the English species of Hairstreaks.

There is, however, one striking exception to this rule, and others of course may be expected. The Marbled White, as Mr. Moncreaff informs me, drops her eggs at random among the herbage, being perfectly well assured that the young caterpillar when hatched will find out, and will crawl up, some blade of grass suitable for him to feed on.

The eggs of butterflies differ very remarkably both in size and shape: in some the surface is most beautifully ornamented as with carved work, but a thousand times more delicate and finer than any carving that human hands could execute; some are exquisitely fluted; others are ribbed, the ribs being from ten to thirty in number, and these are connected by a great number of excessively minute transverse raised lines; some are entirely covered with a net work of raised lines; others have rows of minute warts, forty or fifty in number, all of which converge to a point at the top of the egg; others are perfectly smooth and without markings of any kind; some few of them have a lid at the top, which the young caterpillar gently lifts off when he makes his first appearance in the world. Indeed, the variety of surface in eggs is almost infinite, and so is the shape; some being round, others oblong, and others like champagne bottles, standing upright.

One of the most curious and striking facts, is the extreme difference in the eggs of species, which, in the perfect state, closely resemble each other; thus the egg of the Large Tortoiseshell is pear-shaped and smooth, while that of the Small Tortoiseshell is oblong, with eight very conspicuous ribs. The characters of each egg are, however, so constant in each species of butterfly, that anyone who has paid attention to the subject can immediately say to what butterfly any particular egg belongs. Nevertheless, a naturalist must not delude himself into a belief that he can classify butterflies by the shape or structure of their eggs.

This remarkable diversity in the eggs of butterflies being so opposed to the sameness of shape and surface in the eggs of birds, has not only excited the admiration, but induced the speculation, of philosophers in all ages. Thus Dr. Paley had suggested, that it "may in many instances be referred to that will to alter forms, and so to glorify His wisdom and power, which seem so often to have guided the Great Author of Nature"—a position that seems to me untenable, because it savours of *seeking* that glory which His wonderful works spontaneously afford; and thus to attribute to a Creator feelings that would scarcely dignify a creature. We cannot be too cautious in assigning human motives to the Most High. Man may, perhaps, build marvellous structures, carve exquisite figures, perform feats of intellectual or manual dexterity for his own honour and glory, and without any ulterior beneficial object, but he must not attribute

such a course to his Maker. These reflections have been forced on me by the leaders in our science, or I would not have ventured to express them. Kirby and Spence seem entirely to accept Dr. Paley's explanation.

The substance of the egg-shell is peculiar, but alike in all. It seems to me entirely different from that of a bird, which abounds with calcareous matter, and, in consequence, is very brittle; whereas the egg-shell of a butterfly is more like thin horn—very elastic, very tough, and very pliable—bending in any direction as soon as the caterpillar has escaped. It contains no carbonate of lime, and chemists tell us that it is not acted on by diluted sulphuric acid. Kirby compared the egg-shell of a butterfly to the membrane that lines the egg-shell of a bird; but it appears to me much less pliable and even less flaccid, and much more elastic, than that integument. The interior of the egg consists of a transparent colourless fluid, much resembling the white of a bird's egg; but I have never been able to find anything at all analogous to the yolk.

With the act of egg-laying the care of the mother butterfly ceases altogether. Although we have a great number of pleasing accounts of plant-bugs and earwigs sitting on their eggs, and hatching them by the warmth, or, more properly speaking, by the coldness of their bodies, and afterwards of collecting them under their bodies as a hen does her chickens, and still after that of the little ones following their mother in a family group, just as chickens run after a hen; still nothing of the kind has ever been noticed in butterflies, and the parent seems invariably to have completed her task when she has placed her yet unconscious progeny in a situation where it will eventually be able to obtain its own livelihood. Few butterflies long survive the act of oviposition: it seems the end for which they have lived; and when it is accomplished the termination of their own life is approaching, and the fragile parent resigns its place in the world to its equally fragile descendants. Of the seasons for egg-laying and caterpillar feeding I shall have more to say hereafter. It is not a matter that is governed by any law of general application.

The colour of butterflies eggs is generally pale green or pale yellow, or, in some instances, pure ivory white; but before the shell is burst, and the caterpillar emerges, a very great change takes place; the colour becomes deeper and darker, and the tints—especially the darker ones of the future caterpillar—become visible through the shell, the transparency of which is thus most clearly demonstrated.

THE CATERPILLAR STATE.

Dr. Virey, as well as Kirby and Spence, have followed the old authors in stating that the caterpillars of *Lepidoptera* appear simultaneously with the leafing of trees, and butterflies with the blooming of flowers: however this may be in those lands where this supposed law was laid down, it is quite certain that the great seasons for caterpillars are the end of May and end of August, the first simultaneous with the blooming of flowers, the last with the fine autumnal tints of the falling leaf; so that we must not regard Virey's theory as perfectly satisfactory: it is truthful and tenable only in part. The eggs of all butterflies do not hatch at the same time; the caterpillars do not feed at the same time; they do not turn to chrysalids at the same time. Miss Jermyn, in her "Vade Mecum"—a book that I used to study with intense interest—follows out the theory by telling us that "nature keeps her butterflies, moths, and caterpillars locked up during the winter in their egg state;" evidently intending them to hatch in the spring, feed in summer, and fly in autumn. I believe that Nature obeys her own laws, totally regardless of those we lay down for her guidance. The caterpillar emerges at all seasons; and as the young lawyer is facetiously said to eat his way to the bar, so does the young caterpillar prepare himself for public life, by gnawing away a sufficient portion of the egg-shell in which he had been confined to allow of his escape,

aud by swallowing the chips he had made during the operation. Indeed, this gastronomic feat is often followed by a more extensive performance of the same kiud; for I have often watched him devour the whole of his cradle, except a small shining circular patch where it had been glued to the object on which it was laid. No sooner, however, is the cradle disposed of thau he begius to feed on what we should consider a more natural and appropriate food, namely, the leaves of trees and herbs—a diet to which he confines himself during the remaiuder of his caterpillar existence. His exertious in the way of leaf eating are truly wonderful, and mauy entomologists have amused themselves and their readers by calculating how mauy times its own weight a caterpillar can consume in the course of twenty-four hours—a calculation which tends greatly to the credit of the calculator, but not much to advance the science of natural history.

A caterpillar's life is not, however, one of continual feasting: he is subject to periodical attacks of illness, three, four, five, or six iu number; these arise from his body growing too large for his skin, which, as a natural consequence, grows too small and oppresses him so much that it must be got rid of. The caterpillar is perfectly aware of this, and prepares in the most skilful and methodical mauner for the important event. He first spins or weaves a little carpet on the surface of the leaf or twig where he has been feeding, and then fixes himself to this by means of a circle of very small delicate hooks which surround each of his claspers. The term claspers I will presently explaiu. By means of these hooks the caterpillar is able to cling so tightly to the carpet he has prepared, that I believe it is quite impossible to remove him without damaging both the carpet and the hooks; in fact, in the attempt to remove a caterpillar when thus fixed, the life of the caterpillar is often sacrificed. The process of moulting is a very severe one; and unless the caterpillar be in a state of perfect health at the time it is often fatal, and the poor creature is found dead and still hanging by its claspers from its silken carpet. When the process of moulting goes on favourably it may thus be described: the fore part of the body is turned vigorously from side to side, the skin of the second, third, and fourth segments opens dowu the back, and the head aud anterior part of the caterpillar protrude through the opening: then immediately beneath the head may be seen the shell-like covering of the old head, split down the middle and often into three pieces; the caterpillar next, with a series of convulsive struggles, creeps out of his old skiu, which is left attached to the carpet, and is frequently so perfect and apparently so plump that I have been completely deceived iuto supposing that he was still wearing his old clothes.

The head, antennæ, jaws, and legs of the caterpillar are persistent, aud their horny covering only is shed at the period of moult; aud Swammerdam tells us that not only the horny coveriug of these parts and the skin of the body comes away at each moult, but also that "the throat and a part of the stomach, and even the inward surface of the great gut, change their skin at the same time. But this is not the whole of these wonders, for at the same time some hundreds of pulmonary pipes within the body cast also each its delicate and tender skin. These several skins are afterwards collected iuto eighteen thicker, and, as it were, compounded ropes—nine ou each side of the body—which, when the skin is cast, slip gently and by degrees from within the body through eighteen apertures or orifices of the pulmonary tubes, uine on each side. Two other branches of the pulmonary pipes, that are smaller and have no poiuts of respiration, cast a skin likewise. If any one separates the cast little ropes or cougeries of the pulmouary pipes with a fine needle he will very distinctly see the brauches and ramifications of these several pipes and also their annular composition."

This really marvellous description of the moulting of the skins of the viscera is copied from Kirby and Spence, and not from Swammerdam, because I do not possess the original; and much as I dislike to quote secondhand, I

have no hesitation about accepting the facts recorded. There is another feature in this periodical moulting equally interesting, and that is that the spines, hairs, warts, and other appendages of the skin, so conspicuous in many of the caterpillars, are shed with the skin, and, we learn from the same high authority, are replaced by similar ones which existed and have been perfected beneath the skin that has been cast, although of necessity bent down and flattened between the new and old cuticles. The observations of Swammerdam are confirmed by precisely similar ones recorded by Bonnet, but have been called in question in some of their details by Herold; still these objections have only been raised in respect of the moulting of some of the minor air-vessels. No doubt has been expressed as regards the larger air-vessels commonly known as tracheæ.

After this formidable operation of moulting is accomplished, the body is excessively soft and tender; the head afterwards so hard, and the legs afterwards so horny and so sharp-pointed, are as pliable and yielding as the most delicate skin, and are covered with a transparent gummy fluid, which was previously confined between the new skin and the old: as the creature now lies exhausted by the exertion, the fluid gradually evaporates, and the new skin gradually acquires the hardness and dryness of the old one: and when the caterpillar has thoroughly recovered its former state, its appetite seems to return, and its voracity to be redoubled, as if to make amends for its lengthened abstinence. Its colours, which on first emergence were dull and faint, become vivid and distinct, and its whole appearance is altered and improved by the ordeal through which it has passed.

The caterpillars of butterflies are extremely fastidious about their food, in this respect differing very essentially from other leaf-eating creatures. We know that horses, cows, sheep, and pigs will eat with apparent relish almost any foliage that is offered them, and birds in a cage seem glad of every green leaf. With caterpillars it is otherwise; they uniformly refuse almost everything except the leaves of that particular species of tree, shrub, or herb on which the parent had laid its egg. It is very interesting to observe the wonderfully perfect power of discrimination which they exhibit, a power that seems vested in twelve minute microscopic eyes, seated six on each cheek, almost close to the mouth: these eyes are highly convex lenses, strikingly reminding one of a Coddington lens: such is the extreme convexity of these eyes that it is impossible for them to convey an idea of any object to the insect using them unless they are brought into contact, or nearly so; consequently, the caterpillar seems to examine with his mouth the surface of each leaf before he ventures to nibble. If you take a caterpillar from oak and put it on hawthorn, it will maunder about in hopeless helplessness; and if you change one from hazel to birch, the same effect will be produced: the position of these microscopic eyes is admirably adapted for the purpose they serve: they are only capable of discerning an object immediately below them. How different is this from the conduct of the parent butterfly, which selects even from a distance the leaf designed by Nature to serve as food for her offspring.

The caterpillars of butterflies are composed of thirteen rings or joints, which entomologists call segments.

The first segment is the head, and is furnished with two short antennæ, two feelers, two jaws, and the twelve minute microscopic eyes to which I have already alluded.

The second has two spiracles or breathing holes, one on each side, and two jointed legs.

The third has two jointed legs only.

The fourth has two jointed legs only.

The fifth has two spiracles only.

The sixth has two spiracles only.

The seventh, eighth, ninth, and tenth, have each two claspers and two spiracles.

The eleventh and twelfth have each two spiracles only.

The thirteenth has two claspers only.

It is almost useless to say anything about the use or objects of the ANTENNÆ, after all that has been written; but it is the general fault of all scientific men who have written on the subject to assume that they must be

the seat of one of those senses the use of which we seem to understand so well in ourselves. Now, it is most illogical to assume that the antennæ serve for purposes of sight, taste, smell, hearing, or touch, because we possess these senses seated in certain organs in our own bodies. We cannot refer the wings of insects to any organs we ourselves possess, and we only learn their use by seeing them employed. Why may not the antennæ be the site of some other function not performed by any of our own organs? Why seek to invest them with the powers of our own eyes, or ears? The subject may be safely left as one above our comprehension.

The SPIRACLES are a series of nine oval holes on each side, through which the caterpillar breathes: they communicate with the tracheæ or breathing-tubes I have already described as moulting in so marvellous a manner simultaneously with the exterior skin.

The CLASPERS are fleshy, retractile, or partially retractile, organs, ten in number, distributed as above indicated; their use is to grasp firmly the food plant on which they are standing, and thus allow the legs perfect freedom of motion. They are possessed only by caterpillars, never occurring in the perfect insect, and are very rarely found in any caterpillars excepting those of butterflies, moths, and sawflies. Each clasper terminates in a flat circular disk, the margin of which is fringed with recurved prehensile hooks.

THE CHRYSALIS.

The next change is one of the most important steps in the life of a butterfly: it ceases to eat; and not only this, the caterpillar seems to take the utmost pains to eject every particle of food from the alimentary canal, and, we are told, evacuates also, together with the excrement, the very lining of its intestines. The colours of the skin change, fade, and entirely disappear; and the creature wanders restlessly and, as we should say, unmeaningly from place to place. Whatever the object of this restlessness—and I do not doubt it has some object in that great scheme of life, so complete in all the parts we can understand—still, I say, whatever the object of this restlessness, its termination is invariably the same; it ends in the creature's finding some place of real or fancied security in which to undergo its change to a chrysalis. This being found, the next process is to spin a little pad of silken threads crossing each other in every direction—and it would seem that almost every caterpillar has the power of elaborating silk, and of emitting it through the mouth in the form of thread; when this silken pad is complete, the caterpillar grasps it with his last pair of claspers, and then, allowing his body to hang down, waits awhile for the change that is progressing within. After the lapse of a day, or sometimes two days, we observe something like a renewal of those twistings and contortions which precede or accompany each moulting, and then the caterpillar skin is seen to open behind the head, and by the alternate contractions and dilations, the chrysalis, now perfectly formed, is seen to force itself through the opening, the upper part of the back coming first, and acting as a wedge to open the slit wider and wider, until all the chrysalis has passed through the opening, and the skin of the caterpillar, wrinkled and shrivelled, is pushed down to the lower end of the chrysalis, and *there* remains, just like a stocking rolled down to the ankle before withdrawing it from the foot. "The chrysalis being much shorter than the caterpillar is as yet at some distance from the silken pad on which it is to be fastened; it is supported merely by the unsplit terminal portion of the latter's skin. How shall it disengage itself from the remnant of its case, and be suspended in the air while it climbs up to take its place? Without arms and legs to support itself, the anxious spectator expects it to fall to the earth. His fears, however, are vain; the supple segments of the body of the chrysalis serve in the place of arms. Between two of them, as with a pair of pincers, it seizes on a portion of the skin, and bending its body once more, entirely extricates its tail from it. It is now wholly out of the skin, against one side of which it is

supported, but yet at some distance from the leaf. The next step it must take is to climb up to the required height. For this purpose it repeats the same ingenious manœuvre, making its cast-off skin serve as a sort of ladder, it successively with different segments seizes a higher and a higher portion, until in the end it reaches the summit; with its tail it feels for the silken threads that are to support it. But how can the tail be fastened to them? you ask. This difficulty has been provided against by Creative Wisdom. The tail of the chrysalis is furnished with numerous little hooks pointing in different directions, as well adapted to the end in view as the crochets on the caterpillar's claspers, and some of these hooks are sure to fasten themselves upon the silk the moment the tail is thrust amongst it. Our chrysalis has now nearly performed its labours; it has withdrawn its tail from the slough, climbed up it, and suspended itself from the silken pad, manœuvres so delicate and perilous that we cannot but admire that an insect which executes them but once in its life should execute them so well; nor could it, as Reaumur has well and piously observed, 'had it not been instructed by a Great Master.' One more exertion remains: it seems to have as great an antipathy to its cast-off skin as one of us should, when newly clothed after a long imprisonment, to the filthy prison garments we had put off. It will not suffer the memento of its former state to remain near it, and is no sooner suspended in security than it endeavours to make it fall. For this end it seizes, as it were, with its tail, the threads to which the skin is fastened, and then very rapidly whirls itself round, often not fewer than twenty times. By this means it generally succeeds in breaking them and the skin falls down. Sometimes, however, the first attempt fails: in that case, after a moment's rest, it makes a second, twirling itself in an opposite direction, and this is rarely unsuccessful. Yet now and then it is forced to repeat its whirling not less than four or five times, and Reaumur has seen instances where the feet of the skin were so firmly hooked that, after many fruitless efforts, the chrysalis, as if in despair, gave up the task and suffered it to remain. After these exertions it hangs the remainder of its existence in this state until the butterfly is disclosed."

This beautiful and graphic account of the conduct of the chrysalis on what may be called its birthday, is extracted from that inexhaustible mine of insect-lore, "Introduction to Entomology," by Kirby and Spence. I have, however, verified the facts from actual observation, and only copy the details instead of writing them anew, because the phraseology of their admirable writings is so much better than my own. Still, although I can confirm the statements and attest the accuracy of the description, I am unwilling to accept the reason assigned for some of these extraordinary proceedings. I do not imagine that the whirling movement is performed for the purpose of getting rid of the cast skin: in the *first* place, because I find that many species elect to retain the skin until the final assumption of the butterfly state, and to preserve it like the rolled-up stocking to which our authors have compared it—this is certainly the case in that family which I shall call *Satyridæ*, and probably in many others; and, in the *second* place, this whirling is not peculiar to this period of chrysalid existence, and can be induced by irritation whenever an entomologist inclines to make the experiment.

I must here explain that the chrysalids of insects are of three kinds, called Amorphous (in science *Amorpha*), when they have no resemblance to the perfect insect; Necromorphous (in science *Necromorpha*), when they have a striking resemblance to the perfect insect, and exhibit all its limbs swathed as it were in swaddling clothes; and Isomorphous (in science *Isomorpha*), when they resemble the perfect insect in everything but the possession of wings. The amorphous and necromorphous chrysalids can neither eat, fly, nor run; the isomorphous chrysalids, on the contrary, eat voraciously, leap and run with vigour, but cannot fly. *Lepidoptera*, and consequently butterflies, belong to the amorphous division.

THE BUTTERFLY.

When the time for the final change has arrived, the colours and markings of the perfect insect begin to make their appearance through the horny shell which envelopes the chrysalis, and in a short time this horny shell splits in various places, cracks open between pieces of the shell, and the perfect insect emerges. I say perfect, but, alas, how apparently imperfect! The wings, instead of being those rigid and powerful organs which are soon to become so characteristic of a butterfly, and are so well adapted to bear him on the most distant aërial excursions, are diminutive, shapeless abortions, folded over his chest, limp, pliable bags, filled with colourless blood which has hereafter to be diffused throughout the body. "To observe how gradual and yet how rapid was the development of the joints and organs, and particularly of the wings, and the perfect coming forth of the colours and spots as the sun gave vigour to it, was a more interesting spectacle." I will continue to quote Kirby and Spence, for, although I can readily imagine no one has so long or so intently studied these proceedings of Nature as I have done, yet I feel painfully conscious of my inability to describe them with the force and truthfulness that so distinguishes the writings of those illustrious entomologists. They are describing the emergence of the swallow-tail:—"At first it was unable to elevate or even move its wings, but in proportion as the aërial or other fluid was forced by the motion of its trunk into the nervures, their numerous corrugations and folds gradually yielded to the action, till they had gained their greatest extent, and the film between all the nervures became tense. The ocelli and spots and bars, which appeared at first as but germs or rudiments of what they were to be, grew with the growing wing, and shone forth upon its complete expansion in full magnitude and beauty. To understand more clearly the cause of this rapid expansion and development of the wings, I have before explained that these organs, though often exceedingly thin, are always composed of two membranes, having most commonly a number of hollow vessels, miscalled nerves, running between them. These tubes—which, after the French entomologists, I would name *nervures*—contribute as well to the development of the wings as to their subsequent tension. In the chrysalis, and commonly afterwards, the two membranes composing the organs in question do not touch each other's inner surface as they afterwards do: there is consequently a space between them; and being moist and corrugated into a vast number of folds, like those of a fan, but transverse as well as longitudinal, and so minute as to be imperceptible to the naked eye, the wing appears much thicker than in the end. Now, as soon as the insect is disclosed a fluid enters the tubes, and being impelled into their minutest ramifications, necessarily expands their folds; for the nervures themselves are folded, and as they gradually extend in length with them, the moist membranes attached to them are also unfolded and extended. In proportion as this takes place the expanding membranes approach each other, and at last, being dried by the action of the atmosphere, become one. To promote this motion of the fluid seems the object of the agitations which the animal gives from time to time to its unexpanded wings."

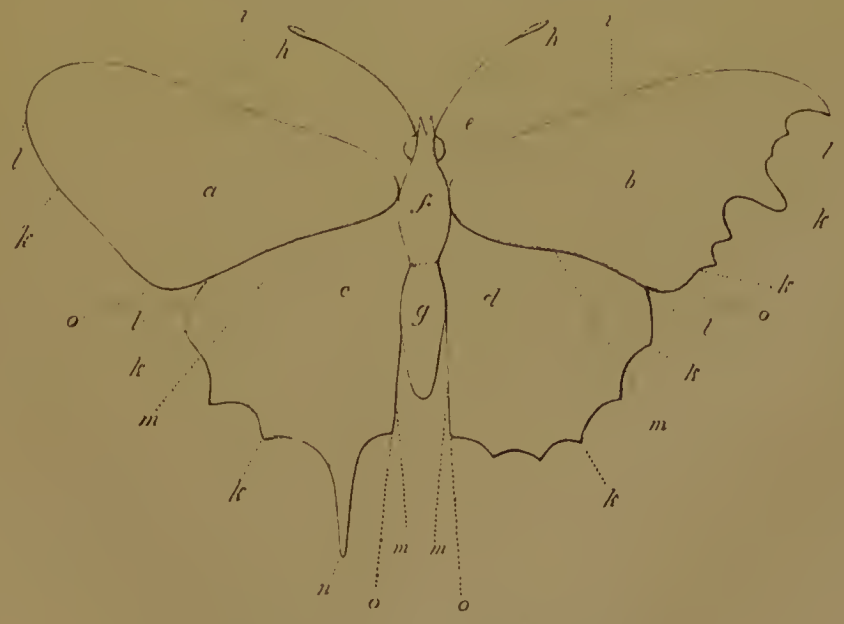
That a fluid precisely analogous to our blood, but having no red colour, circulates in every part of an insect's body, has been proved beyond question. Dr. Bowerbank was the first entomologist in this country who by means of a powerful microscope established the fact; and although prior to this important discovery there was a disposition to doubt the existence of circulation in the insect world, every man of science at once accepted Dr. Bowerbank's views as conclusive; and no hesitation is now expressed on a subject where an exception to the ordinary law of Nature had been for a series of years supposed not only possible but unquestionable—so ready are we to accept any conclusions that supersede the trouble of investigation.

We have seen that the membranous portion of the wing is spread between certain supports, which Messrs. Kirby and Spence, adopting the nomenclature of French entomologists, have

been pleased to term "nervures." It results from a careful examination of the writings of entomologists, that exactly one third have described these supports as "veins," exactly one third as "nerves," and exactly one third as "nervures," or "nervules;" the advocates for each term having shown to their own entire satisfaction its peculiar and exclusive propriety. The argument always runs thus: "We know very well that these organs are not veins (or 'nerves,' or 'nervures,' as the case may be), but it is a matter of convenience so to denominate them; and no sensible man will deny the advantages of a uniformity in anatomical nomenclature." This reasoning appears to me somewhat illogical: if we "know very well" that the wing of a bird is not a leg, it can be no convenience to any one to call it a leg; if we "know very well" that the head of a horse is not its tail, it really can be no convenience to call it a tail. We know exactly the use and object of these supports: it is precisely the same as that of the fin-rays of a fish, which are invariably called "rays," and therefore, wherever I have had occasion to mention these rays, either in the present "history," or in that previously published of the "British Moths," I have invariably called them "rays"—a term which I venture to hope all my readers will accept, since they cannot fail to understand.

EXPLANATION OF TERMS.

With the single exception of wing-rays, which my readers will please to understand as precisely equivalent to the fin-rays of fishes, I shall use no terms except those of universal acceptation when speaking or writing of insects; and I could wish that I had no occasion to use a single word that could not be found in Johnson's Dictionary; but this is very difficult, and I find, after every endeavour to avoid the use of new words, or of applying new meanings to old words, I am absolutely compelled to do that which I have the most anxious desire to avoid. It is no common achievement to have removed so many of those stumbling blocks to the acquisition of scientific knowledge—italics, abbreviations, and signs; this is happily accomplished, and we must content ourselves therewith, and not quarrel over a few unusual words, but endeavour to make them both familiar and intelligible.



Explanatory Figure of a Butterfly.

In order that the terms used in describing may be rendered as intelligible as possible, I have drawn the outline figure of a butterfly, and indicated by letters the different parts I

have had occasion to explain. The figure is perfectly imaginary; no such butterfly having ever existed; it is comprised of parts of butterflies which really do exist; one wing is abstracted from a Swallow-tailed, another from an Angle-winged, and so on.

a, *b*, *c*, *d* are the four wings.

e, the head.

f, the thorax.

g, the body.

h, the antennæ, or feelers.

These are the only parts of a butterfly mentioned in descriptions, except the legs, which are generally hidden from sight, and never used to distinguish species, but only families from each other.

We will now proceed to consider the margin of the wing; there is very little occasion to describe the word "margin"; it is familiar to everyone: the outline or boundary line of the wing is the margin. But there are several sides to the margin: that part of the margin which touches the thorax (*f*) is the base.

i is the costal margin, and extends from the thorax (*f*) to the tip (*l*).

k is the hind margin, it is that part of the margin farthest from the thorax (*f*), and extends from the tip (*l*) to the anal angle (*o*).

l is the tip of the wing.

m is the inner margin, so called because innermost or nearest the body; the butterfly can almost bring this margin close to its body so as to touch it: this inner margin (*m*) extends from the anal angle (*o*) to the thorax (*f*).

n is the tail; this occurs rarely, and only on the hind wings. Of course this is not a real tail, but only a projecting portion of the wing, and made of membrane exactly similar to the rest.

o is the anal angle of the wing.

Lastly, as regards the shape of the wing, or perhaps, more properly and precisely speaking, the outline of the hind margin: you will see at the most cursory glance, that this outline differs in the four wings I have represented.

a is a rounded wing, or a wing with the hind margin rounded.

b is an angled or angulated wing, or a wing with the hind margin angled.

c is a tailed wing, or a wing with the hind margin tailed, *n* being the tail.

d is a scalloped wing, or a wing with the hind margin scalloped or cut out into semi-circular notches.

HYBERNATION.

This word has puzzled many, and its meaning, as applied to butterflies, still more. The life of a butterfly extends over twelve months, subject to certain exceptions which will be duly explained in the proper place. The round of existence thus occupying a year, and comprising the four states of egg, caterpillar, chrysalis, and perfect insect, it follows that one of these states must occur in the winter, because the year must include the winter months; but it is ordered by an all-wise and overruling Providence that the winter season shall not occur to all butterflies when they are in the same state: winter must come, *that* is inevitable; but it comes to some when they are eggs, to some when they are caterpillars, to some when they are chrysalids, and to others when they are perfect butterflies. So that the word "hybernation" being simply equivalent to "passing the winter," it is said, and very properly so, that one butterfly—or, as we entomologists more correctly express it, "one species of butterfly"—hybernates in the egg state, another species in the caterpillar state, and so on, as the case may be. Now, it is a most interesting fact, and one that cannot be too strongly impressed on the memory, that all the individuals composing one kind, or more properly one "species," of butterfly always hybernate in the same state: each adheres strictly to the practice of its species; that is to say that if one peacock butterfly passes the winter season in the butterfly state, so will its children pass the next winter in the same state, and its children's children the next following winter in the same state, and so on for countless generations. And if one Hairstreak butterfly passes the winter months in the egg state, in like manner will its

children pass the next winter in the egg state, and its children's children the next following winter in the same state, and so on for countless generations. Some doubt appears still to attach to the state in which some of our English butterflies pass the winter months; while others, on the contrary, are ascertained beyond all possibility of doubt.

Eight hybernate in the egg state—*Quercus*, *W-album*, *Pruni*, *Betulæ*, *Bœtica*, *Ægon*, *Agestis*, *Alexis*.

Twenty-five hybernate in the caterpillar state: *Paphia*, *Aglaia*, *Niobe*, *Adippe*, *Lathonia*, *Euphrosyne*, *Selene*, *Artemis*, *Cinxia*, *Athalia*, *Sibylla*, *Iris*, *Galathea*, *Epiphron*, *Medea*, *Ægeria*, *Semele*, *Janira*, *Tithonus*, *Hyperanthus*, *Davus*, *Pamphilus*, *Hippothoë*, *Phlæas*, and *Cratægi*: the last named differs essentially from the rest in being gregarious, and in passing the winter season under cover of a web.

Ten hybernate in the chrysalis state: *Machaon*, *Sinapis*, *Brassicæ*, *Napi*, *Rapæ*, *Daplidice*, *Cardamines*, *Lucina*, *Argiolus*, and *Alveolus*. In the winter the chrysalids of these butterflies may be found braced up to the stems of reeds, vetches, hedge-mustard, lady's smock, and other herbaceous plants, or against park palings, barns, fences, and out-houses of all kinds. In this state they appear to be perfectly indifferent to cold, and may be converted into solid lumps of ice and yet retain life, as is abundantly proved by their emergence as perfect butterflies in May. I have never known a winter so severe as to make any difference in this respect.

Ten hybernate in the perfect or butterfly state: *C-album*, *Antiopa*, *Io*, *Polychloros*, *Urticæ*, *Atalanta*, *Cardui*, *Rhamni*, *Edusa*, and *Hyale*. Many of these retire to winter-quarters almost immediately on leaving the chrysalis; some creep into hollow trees; I once found more than forty Peacock butterflies in a hollow oak; some hide in barns, stables, churches, or out-houses, always crawling up among the beams and rafters: they especially delight in pig-styes. It will be observed by anyone who is familiar with the appearance of either of the dark-coloured butterflies I have mentioned, that its colour and appearance, when resting on rough, unplaned wood, with its wings erect and closely pressed together, back to back, resemble so exactly that of the wood that the most practised eye is required to detect it. To this similarity it is often indebted for its safety. When a warmer day than usual occurs during the winter months, these hybernating butterflies crawl out of their hiding-places, slowly flap their wings, as if courting the sunshine, and sometimes venture on a fruitless flight in quest of flowers from which to suck the honey. Every year some country gentleman possessed of observing faculties and a ready pen espies one of these butterflies when out on an ill-advised excursion of this kind, and he forthwith writes to the nearest local paper, and reports the unwonted fact to its delighted readers under the head: "Singular occurrence; unusual mildness of the season." If the discovery falls to the lot of a writing entomologist he improves the occasion in a different way, thus: "Singular occurrence; unexpected evidence that *Vanessa Io*, or *Gonepteryx Rhamni*"—as the case may be—"is double-brooded. I have just taken, this 25th of February, a fine and very perfect specimen of *Gonepteryx Rhamni*: now as it is impossible that the specimens which occurred so abundantly last autumn should have survived through the inclement season just past, it is certain that this February specimen must be the descendant of an autumnal specimen, and not one of the same generation." A little more reflection might have induced the query, "On what could the caterpillar have fed during the winter months, seeing that the buckthorn was leafless during the whole time that it ought to have been feeding?"

It is worthy of remark that these autumn-disclosed butterflies, although the sexes occur in equal numbers, rarely take the slightest notice of each other until the return of spring.

CLASSIFICATION.

Having pointed out to the best of my ability those stages in the life of a butterfly, and those characters in the adult butterfly, the modifications and differences in which

will be described in the succeeding pages, it becomes needful to show the application of them to purposes of classification. It will be seen by those who consult the Linnean method, as carried out by our own venerated Haworth, that the perfect insect alone was regarded as furnishing characters for the division and subdivision of groups; but almost simultaneously with the early and invaluable investigations of Linneus, two officers in the Austrian army had discovered the absolute insufficiency of differences in the form of an antenna or the outline of a wing for the foundation of a natural system of arrangement; still, although these gentlemen insisted on the propriety, nay even the necessity, of employing in classification all the characters of caterpillar, chrysalis, and butterfly, our publishing entomologists for more than half a century resolutely resisted the so-called objectionable innovation, and declined to study, except as an authority for the names of species, the most profound and philosophical work that Entomology has yet called into existence.

At last we are beginning to see the necessity for extending the area over which to search for distinctive character. We are now so glad to receive every possible hint from Nature herself, that instead of disregarding the characters of caterpillar and chrysalis, we very frequently wait the discovery of these before venturing an opinion as to the place which any newly-discovered species ought to occupy in a natural system. More than this, a disposition is rapidly gaining ground to acknowledge that the earliest and not the latest stages of an insect's life are the most likely to furnish us with permanent characteristics. It is, however, a matter which I cannot mention without regret, and which certainly may be useful in moderating any extravagant estimate we may form of our own knowledge, that although we accept the importance of the caterpillar and chrysalis in all our arrangements, we have hitherto failed in discovering any character in either by which positively to distinguish a Butterfly from a Moth. This lamentable truth, this necessary admission of ignorance, may not unreasonably suggest the query whether Nature has really drawn any distinct line between the two, and whether the differences which, in common with others, I have pointed out as distinguishing Butterflies from Moths are indeed sufficient for the purpose.

It is doubtless a most noteworthy fact that every character hitherto suggested seems to break down before exceptions, and to destroy the fond hope we may have entertained of being able so to word our definitions that they shall preclude the possibility of exceptions. This, I think, forcibly demonstrates the folly of trying to enforce our views on Nature, who will be sure to have her own way, and go directly to her own object, however inconsistent with our human schemes that object may be. The reader will kindly receive these remarks as somewhat apologetical, and as penned under a deep sense of the imperfection of the classification I am about to propose. I have already explained that the portion of the *Lepidoptera*, or Scale-winged insects, which I am intending to describe are popularly termed "Butterflies" in England and America, "Papillons" in France, and "Schmetterlinge" in Germany. I propose to classify them as below.

BUTTERFLIES (IN SCIENCE *LEPIDOPTERA PEDUNCULATA.*)

1. EXPOSERS (in Science Detegentes).—Those which in the chrysalis state are exposed to the full influence of weather and light, rarely attempting concealment, and still more rarely protected from rain or snow, wind, heat, or cold. When thus exposed during the winter they are not unfrequently frozen, as already stated, into solid and very brittle lumps of ice, and consequently may be broken to pieces without exhibiting the slightest indication of vitality; yet if left unmolested in the situations they have selected they invariably recover, and revert to the condition in which the frost overtook them. These naked and exposed chrysalids are

usually angular, having ridges and salient points on various parts of the body. Nearly all our British butterflies belong to this group: they may be divided into—

i. Suspended (in science *Suspensi*), or those in which the chrysalids are attached by the tail only, and hang with the head downwards. The Butterflies which emerge from such chrysalids possess a character quite as distinctive as that of the chrysalids themselves: they have but four perfect legs, instead of six; these are the middle and hind legs; they have claws at the extremities, while the fore legs are imperfect, have no claws, and cannot possibly be used in walking. The circumstance that the Butterflies of this division possess strongly marked and corresponding characters in the chrysalis and butterfly state is regarded as a sufficient proof that the association is a natural one.

Examples of Suspended Chrysalids.

a. Io b. Atalanta c. Paphia d. Iris e. Megæra f. Galathea

a. Spine-bearers (in science Spinigeri), in which the caterpillars are armed with spines more or less branched: these spines are shed with every moult, but are renewed with the renewed skin, until the final one, when they entirely disappear.

Examples of Spine-bearing Caterpillars.

g. Antiopa h. Io i. Atalanta

b. Slug-shaped caterpillars (in science Limaciformes), in which the caterpillar is sometimes downy or covered with short pile, but is without spines, and is shaped like a slug: its body terminates in two pointed tails, which are directed backwards.

Examples of Slug-shaped Caterpillars.

k. Iris l. Janira m. Galathea

ii. GIRTED (in science *Succincti*), in which the chrysalids are not only attached by the tail, but are also supported by a belt of silk, which passes round the middle of the body, and is firmly fixed on each side. These chrysalids have the heads pointed upwards. The butterflies have six perfect legs.

Examples of Girted Chrysalids.

n. Machaon o. Crataegi p. Brassicæ q. Daplidice r. Cardamines s. Hyale

a. Woodlouse-shaped caterpillars (in science ONISCIFORMES), in which the caterpillars are shaped like a woodlouse, the head being small and retractile and the legs and claspers concealed.

Examples of Woodlouse-shaped Caterpillars.

t. Betulæ u. Pruni v. Corydon

b. Cylindrical caterpillars (in science Cylindracei), in which the caterpillars are cylindrical, the head exserted, and the legs and claspers exposed.

Examples of Cylindrical Caterpillars.

x. Machaon y. Daplidice z. Hyale

2. CONCEALERS (in science Celantes), or those of which the caterpillars hide themselves in a silken follicle or cocoon before changing into chrysalids. These cocoons are generally hidden in clefts of the bark of trees, in rolled-up leaves, or at the roots of grass; some of them are even attached to stems of grass. While the Exposers are what might be called the true or typical butterflies, the Concealers are somewhat intermediate between Butterflies and Moths. In this country the Concealers are few in number, small in size, and insignificant in appearance; but in tropical and sub-tropical countries they are numerous, large, and very beautiful.

Such is an outline of the characters I propose to employ in the definitions which follow. It will be perceived they embrace every state of the living insect. In the year 1834 I made a first attempt to introduce into entomology a formula of classification similar to that suggested by Jussieu, and adopted by Decandolle in the sister science of botany. Up to that date it had been the uniform usage of entomologists to make an "order" of insects correspondent with a "class" of vertebrate animals or of plants—a usage which I cannot but consider undesirable to maintain; and I therefore think it best to employ a formula of nomenclature more in accordance with that which obtains in other divisions of organised beings, believing the less we endeavour to eliminate insects from a *general* classification, or British insects from a *general* system of insects, the more likely are we to attain that commanding knowledge of the subject which is now considered so unnecessary, but which is certainly a rational object of ambition.

Natural order. I.—Spine-bearers (in science *Spinigeri*).

The distinguishing character, and that to which I know no exception, is the spine-bearing caterpillar. The chrysalis is more angled than in any other group, and is always suspended by the tail—a character, however, common to this and the following order. The perfect insect has the fore feet imperfect, totally unfitted for walking, and always without claws; but then again this character is not distinctive, since it applies equally to the next order. The British spine-bearers are divided into four families.

Family 1.—Silver-spotted Fritillaries (in science *Argynnidæ*).

The Caterpillars are almost uniformly cylindrical and almost uniformly spiny: they

generally feed separately on violets, or plants of the natural order Violaricæ, the roots of which have strongly purgative properties, and they are almost invariably refused as food by birds. They pass the winter at the roots of the food plant, or of some neighbouring herbage, either on the ground or near it. They feed principally in the spring, and become chrysalids on the approach of summer. These are humped and angled, and are generally decorated with brilliant metallic colours. The perfect insects have knobbed antennæ; the costal margin of the fore wings is arched, and they have a bold and graceful flight. The colour of the upper side is bright sienna brown, spotted with black; the under side of the hind wings is adorned with spots of the most brilliant silver. We have six species in this country, all of them included in the genus Argynnis.

1.—Silver-washed Fritillary (*Argynnis Paphia*), Upper side of the Male.

1. Silver-washed Fritillary.—The costal margin of the fore wings is strongly arched, the tip very slightly hooked, and the hind margin very slightly incurved about the middle. The hind margin of the hind wings is scalloped, but not deeply: the colour of the upper surface is a bright sienna brown in the male, and the fore wings have four longitudinal raised black stripes on the wing-rays, all of them parallel to each other, and also parallel

Upper side of a Variety of the Male in the cabinet of Mr. Bond.

to the inner margin; they are united by short black bars; there are four similar short black bars near the base of the wing, and two series of roundish black spots parallel with the hind margin: the hind wings have several short transverse black bars near the base, and two series of almost circular black spots parallel with the hind margin. A pair of these black spots intervenes between each two of the wing-rays always without touching them;

but on each of the wing-rays, near its extremity, is a lozenge-shaped black spot. The female differs in being duller in colour, and in

Upper side of the Female.

black; of the hind wings greenish brown, but having the appearance of being transversely, and rather obliquely, striped with dull silver.

wanting the longitudinal black stripes on the fore wings. The fringe is varied. The under side of the fore wings is fulvous, spotted with

This dull silvery wash forms a spot near the base; a bar before the middle reaching half across the wing, and an oblique bar extending

Upper side of a variety of the Female called *Valezina*.

entirely across the wing from the middle of costal margin to the anal angle; there is also a silvery space parallel with the hind margin.

Var. 1.—There is a remarkable variety of the female of this insect of a dark olive-green colour, to which Esper has given the name

Under side of the Female.

Valezina: in this variety all the usual black spots are visible, and towards the tip are some pale blotches. Nearly the whole of the upper side is shaded with smoky-green, but through this shade all the usual markings are distinctly visible.

Life History.—The egg is laid towards the end of July, and sometimes as late as the beginning of August, on dead leaves, or moss, or on the living leaves of dog violet (*Viola canina*) and sweet violet (*Viola odorata*): the female, when engaged in the duty of oviposition, seeks out shaded places under the brush-wood, while the male may be seen sunning himself and displaying his brilliant sienna brown wings as he rests on the blossoms of the bramble, from which he extracts his favourite food: the young caterpillar, which is hatched in about fourteen days, appears quite black at first, but very soon exhibits the markings which are its characteristics when full-grown; indeed, the fulvous stripe-like markings on both back and sides are perhaps more strongly pronounced at this early period than subsequently when arrived at its full size. In September it descends towards the roots of the herbage, and there, as near as possible to the surface of the ground, spins a loose covering, apparently more for the sake of affording a sure hold for the claspers than for protection; and in this situation it passes the winter months, emerging and crawling up the petioles of its lowly food-plants as soon as the new leaves have made their appearance in the spring. It appears to be full-fed during the third and fourth weeks in May; at that period, if disturbed, it falls immediately from its food-plant, bending its head and leg-bearing segments under its body until they come in contact with its ventral claspers; but the terminal segments remain straight, and are not generally incurved. The head is somewhat scabrous, rather narrower than the second segment, and most decidedly narrower than those which follow; the body is of nearly uniform substance, but slightly attenuated towards either extremity, having the incisions of the segments deeply and clearly marked: there are three spines on each side of each segment; each spine arises from a bulbous base, and is narrowed to a point at the distal extremity, emitting throughout its length a number of ascending bristles; two of these spines on the second segment are longer and somewhat more slender than the rest; they are strictly dorsal, and are seated immediately behind the head, over which they are porrected. The colour of the head is black, delicately reticulated with brown, and having the crown of a still paler brown: the body is black, with two yellowish, approximate, dorsal stripes, each about equal in width to a medio-dorsal black stripe by which they are separated; the sides are blackish, adorned with rust-coloured anastomosing lines, extending from spine to spine, in three longitudinal series; all the spines, except two, are rust-coloured, but originate in the black area of the sides; the two excepted are those which project over the head: these are also rust-coloured, with black tips; they originate in the yellowish dorsal stripes already described: the legs and claspers are smoke-coloured. Towards the end of May it attaches itself by the anal claspers to a slight silken coating it has previously spun on the stem of a bramble or the twig of some low shrub, and, suspended with its head downwards, it changes to an obese, humped, and angulated chrysalis, having a divided or cared head, an elevated ridged thorax, and two rows of lateral abdominal tubercles, six in each row, and all having much the appearance of aborted spines, and being very evidently the representatives of the spines so conspicuous in the caterpillar; the two porrected spines on the second segment are also represented by two tubercles just behind the head: the colour is gray, delicately reticulated with darker shades, and often adorned with spots and washes of the most brilliant and glittering metallic lustre.

Obs.—In making my description of this caterpillar I have been greatly indebted to a coloured drawing from the inimitable pencil of Mr. Buckler, who has also most obligingly furnished me with the subjoined more precise information respecting the identical individual he has figured:—"A single whitish egg was

discovered, from a careful scrutiny of a small bit of moss at the foot of an oak in a wood, by the Rev. A. Fuller and a friend of his, who had previously observed a worn female settled on it. The egg was given to me early in August, and by the 1st of September, 1861, it hatched a small black caterpillar, which fed on the dog violet until November, when I could no longer see it on the plant: it had previously been about three lines in length: a fine web seemed drawn about the base of the stem of the plant, over the moss which was potted with it, under a glass cylinder, and placed in a sunny window: I cannot affirm that the web was spun by the caterpillar. In April, 1862, it appeared again on the plant, about four lines in length, and continued to feed well; and on May 5th it had attained about an inch in length, when I took it out to figure, and to change the plant for another. On the 18th May it had arrived at its full growth, when I took a second figure of it, and two days later it had attached itself to the side of the glass cylinder, and became a chrysalis, brown, with burnished gold spots; and the butterfly, a male, appeared on the 30th of June, 1862."

Time of Appearance.—The caterpillar lives through the winter: I have always found the chrysalis in June, and the butterfly is on the wing at the end of that month, or in July.

Localities.—Although it may be seen skimming over a green meadow now and then, or even venturing into a cottage garden, the Silver-washed Fritillary is decidedly a wood insect, and I imagine occurs in almost every extensive wood south of the Tweed; preferring, indeed, the outskirts or the open spaces, but it is truly a native of woods, and its earlier states are spent in deep shade, although when mature it delights to bask in the sunshine, and to feast on the flowers of the blackberry. It is found more or less abundantly in all the English and Welsh counties, from which, through the kindness of correspondents, I have received lists, and its non-appearance as a native of the others implies rather the absence of observers than the absence of the butterfly. It is reported to me from Ireland by the Hon. Emily Lawless, Mrs. Battersby, Mr. Fetherstonhaugh, Mr. Birchall, and Mr. Marsden, as an inhabitant of the counties Dublin, Wicklow, Cork, Kerry, Mayo, and Westmeath: at Glenmore, Crossmolina, and Killarney, it is abundant; and Miss Lawless informs me it is wonderfully abundant in Recess Woods, Connemara, settling in thousands on the brambles; also at Castle Hacket, and in several Galway localities. In Scotland it is apparently rare; but Mr. Birchall informs me he has taken it at Arrocher; and as it occurs not uncommonly in our northern English counties, Northumberland, Cumberland, and Durham, it may be inferred that its rarity in Scotland is rather apparent than real.

Localities of the Variety Valezina:—

Devonshire. This grand variety was first taken in England by Mr. Dale, who captured it in the New Forest; it was added to the list of Devonshire insects by Mr. Rogers, of Plymouth, who took it in Bickleigh Vale.—*Reading's Catalogue.*

Dorsetshire. It occurs at the Caundle Holt, about three miles from Glanville's Wootton.—*J. C. Dale.*

Hampshire. Of the black variety of the female Paphia we captured twenty specimens in the New Forest, besides missing several others.—*H. Ramsay Cox.*

Kent. We met with a fine specimen in a wood near Sturry, in Kent, several years ago; the net caught in a thistle, and consequently the butterfly escaped.—*H. Ramsay Cox.*

2. Dark Green Fritillary.—The costal margin of the fore wings is regularly arched, the tip obtuse, and the hind margin nearly straight; the hind margin of the hind wings is scalloped, but not deeply so: the colour of the upper surface is bright sienna brown in the male, duller and very frequently suffused with smoky black and metallic green in the female: all the wings are ornamented with black spots in both sexes, and the position of these spots will be best seen and understood by examining the figures: the fringe is spotted. The underside of the fore wings is fulvous,

2. Dark Green Fritillary (*Argynnis Aglaia*), Upper side of Female.

with black spots, occupying the same position as those on the upper side, but smaller and less conspicuous: there are several silvery spots towards the tip of the wing: the hind wings are metallic green at the base, olive green in the disk, and in the olive green part

Under side of Male.

are a number (usually fourteen) of silver spots, the exact position of which is shown in the figures; the green space is followed by a band of plain fulvous, and this by a band of seven semicircular silver spots, each surmounted by a crescentic green spot: a narrow brown line

Under side of a Variety of the Female called *Charlotta*.

adjoins these semicircular silver spots, and beyond this is a narrow fulvous border on the hind margin.

Var. 1.—The Queen of England Fritillary *Argynnis Charlotta*. My gifted predecessor, who gave both the English and scientific name

to this variety, considering it to be a distinct species, says: This butterfly, which is very like the preceding (Aglaia), but distinct and much more beautiful, differs in the following characters: the fore wings have but four instead of five costal lituræ on each side, of which two are compound, and not one only, as in Aglaia: the hind wings have nineteen instead of twenty-one silver spots, and of these the three anterior ones are thrice larger than in the preceding; the middle one has a black spot towards the base.

Life History.—The egg is laid in August on the dog violet (*Viola canina*), and the caterpillar emerges in about a fortnight, and begins to feed on the leaves, but does not acquire any considerable size before the autumn, when it retires towards the root of the plant, or conceals itself under dead leaves, and there remains until the following spring, when it again feeds on the leaves of the dog violet. The following description is from the pen of Mr. Buckler:—

"When nearly full fed it measures an inch and five-eighths in length, and tapers a little towards the head, and more towards the anal extremity. It has six rows of black spines branched with short black hairs—namely, on each side, a sub-dorsal, a lateral, and a sub-spiracular row, except as follows: the second, third, and fourth segments have but sub-dorsal and sub-spiracular rows, or four spines on each segment, the sub-dorsal being rather shorter than the others; and on the second segment they are simple spines, leaning over the head and curved slightly backward. All the other segments have six spines in the order before mentioned, slanting a little backwards, and more so on the two last. The head is black, shining, and hairy. The colour of the body a dark, shining, violet-gray, thickly marbled with velvety black; the gray not very conspicuous, except at the segmental divisions and along the spiracular region, where it forms an undulating interrupted line. The slender dorsal line is black, and expands in width near the middle of its course through each segment, and is bordered on each side with a stripe of bright ochreous yellow, which expands in width just in advance of the widest part of the black mediodorsal line; the spiracles are black, delicately margined with gray, and close below each spiracle is a blotch of bright orange-red, connected below with a thin line of orange ochreous, that runs beneath the lowest row of spines; the belly and claspers are blackish brown. When eating it keeps advancing with every mouthful until it has got to the end of the leaf, and then quickly walks backwards to the point of commencement and proceeds as before, always making a quick retrograde movement before again eating its way forward; and these operations are performed with such rapidity that half a large leaf quickly disappears. When its hunger is appeased it usually retires below the leaves or rests on the stalks of the plant. It continues to feed until the first or second week in July, when it spins together four or five of the rather large leaves at the top of the plant, forming a kind of square tent-like enclosure, within which it retires. After the lapse of a week it turns to a chrysalis, suspended by the tail to the underside of a sloping leaf, its surface covered with a circular mass of silk, thickest in the centre, to which the anal hooks of the chrysalis are attached in a horizontal position; the back being so much curved round towards the leaf as to imitate the upper two-thirds of the letter S. It has a deep depression on the back below the thorax, and a square form towards the head; the wing-cases are thick, with prominent edges below; the segmental divisions of the body are well defined, and having on their upper surface two rows of blunt conical projecting points. The colour of wing-cases, head, and thorax is pitchy-black, with some reticulations of brownish-ochreous, visible chiefly at the margins of the wings; the body has the same ochreous tint mottled with brown; the prominent cones are blackish with ochreous points; the spiracles are black. Its whole surface is shining as though highly varnished."—*Buckler*.

Time of Appearance.—The caterpillar lives through the winter; the chrysalis is to be found in June and the butterfly in July.

Localities.—My experience of this insect is that it is of much less common occurrence than the preceding, and also that it selects different situations. I have never observed it in woods; but this must not be supposed sufficient proof that it never occurs in them: its favourite localities are the sides of hills partially covered with the common brakes (*Pteris aquilina*), and having a scattered growth of the mountain violet (*Viola lutea*); and it appears to delight in sand-hills by the sea-side, especially where the marram or sea reed (*Ammophila arenaria*) and sea lyme-grass (*Elymus arenarius*) abound. I have not observed any species of violet to occur commonly in such situations. In Ireland, as I am informed by the Hon. Miss Lawless, it was rather plentiful in the year 1866 in Lyons' Woods, and in one or two places near; and by Mr. Birchall, that it is common everywhere on the sea-coast. In Scotland it appears to be abundant, and has been taken by Mr. Douglas on the shores of Loch Katrine, by Mr. Campbell at Millport, by Dr. Syme at Dollar, and Mr. Birchall in Argyleshire and the island of Arran. A reference to Mr. Jenner-Fust's paper on the Distribution of Lepidoptera will show that it has a still wider and more northern range. I give below a more detailed list of English and Welsh localities, with the authority for each in italics.

Anglesea. Sea-coast near Beaumaris, on a bank close to the Menai—*E. Newman.*

Berkshire. Burghfield, near Reading—*C. S. Bird.*

Brecknockshire. Very common on the ferny hills near Builth, especially on the sloping sides of the river Elan, as Cwm Elan. The counties of Radnor and Brecknock meet at this spot, and this butterfly is equally common in both—*E. Newman.*

Buckinghamshire. Drayton-Beauchamp, Aston-Clinton, Birchland—*H. H. Crewe;* Halton—*J. Greene.*

Cambridgeshire. Ely—*Marshall Fisher*; common some seasons in Horningsea and Quy Fens, near Cambridge.—*Thomas Brown.*

Cheshire. Sandhills on the sea-coast—*E. Birchall.*

Cumberland. Barron Wood, near Armaithwaite. Very common in the county and throughout the lake district—*J. B. Hodgkinson.*

Devonshire. Near Newton Abbott—*J. Hellins;* Whitsand Cliffs, Staddon Heights, Bolt Head, Berry Head, Babbington, Roborough Down, Hingston Down, Dewerstone, Exeter, Torquay, Sidmouth, Launceston—*Reading's Catalogue.*

Dorsetshire. Two specimens at Glanville's Wootton very many years since; Lulworth Downs; downs near Abbotsbury—*J. C. Dale.*

Durham. Woodlands, near Shotley Bridge—*William Backhouse;* Gibside—*William Maling.*

Essex. Southend—*W. H. Harwood.*

Glamorganshire. Common at Llantrissant—*Evan John;* on sand-hills on the coast—*J. T. D. Llewelyn.*

Gloucestershire. Dursley, Painswick, and in most of the hill districts—*J. Merrin;* abundant at Daneway Common and Sapperton—*M. G. Musgrave;* Leigh, Brockley, and other places near Bristol—*Alfred E. Hudd;* not uncommon in the woods above Wootton-under-Edge—*V. R. Perkins.*

Hampshire. Lyndhurst and Brockenhurst—*W. Buckler.* New Forest and other woods—*J. B. Corbin.*

Herefordshire. Hunter's Gate, Oakley Park, common—*F. E. Harman*; Croft and Berrington—*Mrs. Hutchinson.*

Huntingdonshire. Monk's Wood—*J. F. Stephens, F. Bond.*

Kent. East Cliff, at Folkestone. Very plentiful on the slopes behind Dover Castle—*G. H. Raynor;* on the open downs everywhere between Canterbury and the North Foreland—*W. O. Hammond.*

Lancashire. Sand-hills on the sea coast—*E. Birchall;* common on the sand-hills near Blackpool—*J. B. Hodgkinson;* Silverdale—*James Murton.*

Lincolnshire. Common in the county—*T. H. Allis.*

Man, Isle of. Taken at Douglas—*E. Birchall.*

Monmouthshire. Rather scarce, Heullis Wood—*George Lock.*

Nottinghamshire. Very common at Mansfield—*R. E. Brameld.*

Radnorshire. On the ferny hills near Rhayadr—*E. Newman.*

Rutland. Common in the county—*T. H. Allis.*

Shropshire. On the Wrekin—*C. J. Barrett.*

Somersetshire. Clevedon—*F. D. Wheeler;* Brockley—*W. H. Grigg;* Portishead—*A. E. Hudd.*

Staffordshire. Dovedale and Charnwood—*Edwin Brown.*

Suffolk. Bentley, Stowmarket—*H. H. Crewe;* Sudbury—*John Grubb.*

Surrey. Occurs, but not commonly, at Witley, near Godalming—*C. G. Barrett;* Mickleham—*J. Walton.*

Sussex. Goodwood racecourse—*W. Buckler;* Shancktonbury Ring, near Steyning, abundant; also near Beeching Chalkpit—*J. H. White;* Abbot's Wood, near Hailsham—*C. V. C. Levett;* about Lewes, abundant on the downs between Firle and Seaford—*E. Jenner.*

Westmoreland. In the woods about Windermere, from Bowness to Newby Bridge, in July and August—*J. B. Hodgkinson.*

Wight, Isle of. Bonchurch Downs—*F. Bond;* Ventnor and Parkhurst—*Alfred Owen.*

Wiltshire. Savernake Forest and West Woods; Great Bedwyn—*T. A. Preston.*

Worcestershire. Monkswood—where it must be scarce, as I have only met with one specimen—*J. E. Fletcher.*

Yorkshire. Near York—*Robert Cook;* abundant on moors and open ground above Cloughton—*J. H. Rowntree;* Scarborough, Wakefield, Sheffield, Leeds—*E. Birchall;* common in oak woods about York, Scarborough, and all the southern parts of the county—*T. H. Allis.*

Localities of the Variety Charlotta.—This variety is either very rare or is not generally distinguished from Aglaia: I have only two localities:—

Bedfordshire. Lately detected in Bedfordshire, and sent me by my friend, Dr. Abbott—*Haworth.*

Cumberland. As common as Aglaia in some districts of Cumberland—*J. B. Hodgkinson.*

Obs.—I have seen but one specimen, the property of Mr. Bond, kindly lent me to figure.

3.—Niobe (*Argynnis Niobe*). Upper and Under side of the Female.

3. Niobe.—The costal margin of the fore wings is arched, the tip obtuse, and the hind margin rather convex and slightly scalloped; the hind margin of the hind wings is more decidedly scalloped, but still not deeply so; the colour of the upper surface is bright sienna brown, with the customary black markings: in the male the brown colour extends nearly to the base, as in Adippe; in the female the base is dark brown or black, and adorned with metallic-green reflections, as in Aglaia: beneath, the silver spots of the hind wings are arranged as in Adippe, the supplementary series of minute silver spots being present, but somewhat indistinct; all the silver spots have distinct black borders.

Var. Eris.—All the discoidal silver spots on the under side of the hind wings are replaced by pale ochreous spots, without metallic tints, their black borders being even more distinct than in the type; the submarginal series of minute spots still retain their silvery hue, and the silver also appears in the submarginal lunules.

Life History.—The caterpillar is covered with long branched white spines; its back is dark brown, nearly black, with a rather narrow medio-dorsal white stripe, which is intersected by a thread-like black line; there is a sub-dorsal series of eight oblique or acutely triangular white markings, all of which point forwards: the sides are brown, intersected by two very slender white stripes; the head is dark brown, the legs dark brown, and the claspers reddish. It feeds on the wild heart's-ease (*Viola tricolor*). *Hübner's figure.*

Localities.—This species is abundant on the Continent. A single specimen was taken in the New Forest last summer by Mr. Gerrard, of Lyndhurst, and was purchased by the Rev. Windsor Hambrough, as recorded in the "Entomologist," p. 351.

Obs.—Mr. Bond (Entom. v. 17) and Mr. A. G. Butler (Entom. v. 28) express an opinion that this species is only a variety of Adippe, but neither of these gentlemen assigns a reason for taking this view of the case. At a recent meeting of the Entomological Society Mr. Albert Müller mentioned that Meyer-Dür had pointed out certain differences between the caterpillar of Argynnis Adippe and Niobe: in his "Verzeichniss der Schmetterlinge der Schweiz," published in 1852, that author states that Argynnis Niobe in Switzerland inhabits only the alpine and sub-alpine regions from 3000—5600 feet above the sea, and that its caterpillar has in the full-grown state a white dorsal stripe and flesh-coloured spines, whilst A. Adippe is not found at a greater elevation than 3300 feet, and its caterpillar has no white dorsal stripe, but a pale-reddish lateral stripe instead. Mr. Müller argued, that though the food-plants of both were various species of violet, until this evidence was rebutted, or unless two different caterpillars produced the same form of butterfly—unless there were dimorphic caterpillars—Adippe and Niobe must be considered distinct species, even though (which he did not admit) the perfect butterflies were undistinguishable. Mr. Butler replied that he was not acquainted with the caterpillars of Argynnis Adippe and Niobe, and his suggestion that the two forms were one species was made from observation of the perfect insects only; he had found the two flying together, and the sexes pursuing one another: he thought the differences between the butterflies, without amounting to specific distinction, might be accounted for by differences in the external conditions to which they were subject. An instance of this kind had lately come under his notice; in India, Captain Lang had been in the habit of taking what at the time of capture he thought were two distinct butterflies, one in marshy land, the other in dry situations, the marsh insect being thickly covered with down, the highland insect not; but Captain Lang was now satisfied that the two were but one species, Callerebia Scanda, which was liable to modification by surrounding circumstances. Entomologists seem scarcely aware how extensive a subject is opened for discussion if they once maintain that two entirely different caterpillars can possibly produce the same species of butterfly.

4. The High-brown Fritillary.—The costal margin is arched, the tip rounded, and

4.—High-brown Fritillary (*Argynnis Adippe*). Upper side of the Male.

the hind margin nearly straight: the hind margin of the hind wings is scalloped, but not deeply so: the colour of the upper side is bright sienna brown in both sexes, and is without that blackish patch at the base of the wings which distinguishes both sexes of

Upper side of the Female.

Aglaia, and the females of Niobe, but is adorned with numerous black spots, as shown in the figure. The underside is fulvous, the fore wings having numerous black spots, as shown in the figure, and generally some square reddish spots towards the tip, and also from three to five silvery spots: the hind wings are nearly of the same ground colour as the fore

Under side of the Male.

wings, the basal portion of the wing having usually fourteen silver spots of various size and shape, as represented in the figure, and outside of these is an irregular series of silver dots, each surrounded by red-brown, and again beyond these is a row of faint silvery semi-

Under side of the Variety Cleodoxa, in the cabinet of Mr. Bond.

circular markings, each surmounted by a red-brown mark of very similar shape; the hind margin is fulvous.

Var. 1. A very rare variety is entirely without the silver spots on the under side, their space being occupied by fulvous spots of similar size. It has received the name of *Argynnis Cleodoxa*.

Life History.—The egg is laid in August on the dog violet (*Viola canina*), and the young caterpillar emerges in abont a fortnight and feeds on the leaves: it ceases to eat early in the autumn, and retires towards the roots of the food plant, or conceals itself under leaves, remaining entirely out of sight until the following spring, when it finishes its feeding life and prepares to turn to a chrysalis. When full fed it is about an inch and a-half in length and stont in proportion; the head is smooth, and about the same width as the second segment; the second segment has two spines pointing forwards over the head and slightly turned upwards at the tip; the third segment has four spines; the fonrth segment also four, and the remaining segments, as far as the eleventh, six each; the eleventh has four, and the twelfth four: all these spines are covered with bristly hairs. The colour of the head is almost black; that of the body pale brown tinged with flesh colour, and having a medio-dorsal white stripe extending from the fifth to the eleventh segment, both inclusive; this stripe passes through a series of nine semicircular black marks, the convex margin of which is directed backwards, and is narrowly bordered with white; the spines are white at the base, and flesh-coloured at the tip.—*Hübner's Figure.*

Obs.—I have no knowledge of the caterpillar or chrysalis except from books.

Time of Appearance.—The caterpillar lives through the winter. The chrysalis is fonnd in June, and the butterfly in July.

Localities.—It seems to occur both in woods and on nncultivated hill-sides, thus combining the tastes of Paphia and Aglaia. In England it is less frequently met with than either. I have no report of its occurrence either in Ireland or Scotland, but give below some English localities.

Buckinghamshire. Drayton-Beauchamp, Aston-Clinton, and Birchland—*H. H. Crewe;* Halton—*Joseph Greene.*

Cumberland. A single specimen taken in Newbiggin Wood, near Carlisle—*J. B. Hodgkinson.*

Derbyshire. Breadsall, Dovedale, Matlock, Cromford—*H. H. Crewe.*

Devonshire. Near Newton Abbott—*J. Hellins;* Bickleigh Vale, Roborough Down, Shaugh, Morwell Rocks, Exeter, Torquay, Boncy Travey, Launceston—*Reading's Catalogue.*

Dorsetshire. Elsingtou Wood and Caundle Holt, but rare—*J. C. Dale.*

Essex. Rare at Epping—*E. Doubleday;* Colchester, St. Osyth, has been more scarce during the last two or three years than formerly—*W. H. Harwood.*

Glamorganshire. Scarce at Llantrissant—*Evan John;* it occurs in woods at Ynisygerwn—*J. T. D. Llewelyn.*

Gloucestershire. Forest of Dean—*J. Merrin;* on and near Daneway Common and at Sapperton abundant—*M. G. Musgrave;* Leigh, Coombe Glen, near Bristol—*F. D. Wheeler;* near Bristol—*Alfred E. Hudd;* Guiting—*Joseph Greene.*

Hampshire. Common in the New Forest and other Hampshire woods—*G. B. Corbin;* Lyndhurst and Brockenhurst—*F. Bond.*

Herefordshire. Hunter's Gate, Oakley Park—*F. E. Harman;* Croft and Bircher Common—*Mrs. Hutchinson.*

Kent. Fork Common, near Seven Oaks, somewhat abundant—*G. H. Raynor;* Kingswood, Penny-pot Woods, Blean Woods—*Hugh A. Stowell.*

Lancashire. Grange in Cartmel—*J. B. Hodgkinson;* Silverdale—*James Murton.*

Lincolnshire. Common in the county—*T. H. Allis.*

Monmouthshire. Rather scarce, Henllis' Wood—*George Lock.*

Norfolk. Stratton Strawless—*Charles G. Barrett.*

Northamptonshire. Near Towcester—*Hamlet Clark.*

Nottinghamshire. Very common at Mansfield—*R. E. Brameld.*

Rutland. Common—*T. H. Allis.*

Shropshire. On the Wrekin—*C. G Barrett.*

Somersetshire. Brockley—*T. D. Wheeler;* Portishead—*A. E. Hudd.*

Suffolk. Bentley—*H. H. Crewe;* Sudbury—*W. D. King.*

Surrey. Haslemere: not common—*C. G. Barrett.*

Sussex. Shanktonbury Ring, near Steyning, but not common—*J. H. White;* at the Plasket and elsewhere, in the Weald—*E. Jenner;* Abbot's Wood, near Hailsham—*C. V. C. Levett.*

Warwickshire. Rugby—*G. B. Longstaff.*

Westmoreland. Common in the Lake district, especially at Windermere at the end of July and during August—*James B. Hodgkinson.*

Wight, Isle of. Freshwater and near Ventnor—*F. Bond;* Parkhurst, Apse Heath, Newport—*Alfred Owen.*

Wiltshire. Savernake Forest and westwards—*T. A. Preston.*

Worcestershire. Monks' and Shrawley Woods, not common—*J. E. Fletcher;* Great Malvern, scarce—*W. Edwards.*

Yorkshire. Near York—*Robert Cook;* Yedmondale, and on moors near Cloughton—*J. H. Rowntree;* Scarborough and Sheffield—*Edwin Birchall.*

5. Queen of Spain Fritillary (*Argynnis Lathonia*). Upper side of Female.

Under side of Female.

5. Queen of Spain Fritillary.—The costal margin of the fore wings is arched, the tip blunt, and the hind margin slightly incurved below the tip; the hind margin of the hind wings is scalloped, but very slightly: the colour of the upper surface is fulvous brown, not very bright; the base of all the wings is darker, and is clothed with long hair-like scales which have greenish reflections. The whole upper surface of the wings is spotted with black, as shown in the figure: the under side is paler than the upper, the fore wings being adorned with a few silvery spots towards the tip, and having black spots on the disk: the hind wings are adorned with twenty-four brilliant silver spots, of which seven large ones of nearly equal size are arranged round

the margin. Each of these last has a silver dot just above it, and each of these dots is surrounded first by a dark brown ring, and then by a red brown space; between this series of silvery dots and the base of the wing are about ten brilliant silver spots, which are very various in size and shape, but two of them are conspicuously larger than the rest.

Life History.—The egg is laid in the autumn (August or September) on the wild heartsease (*Viola tricolor*) and other species of violet, and the caterpillar is hatched in about a fortnight: it hybernates when very small at the roots of herbage, and does not reappear until quite late in the spring; it then feeds again on the leaves of the heartsease, and is full fed about Midsummer: it is then about an inch in length; the head is slightly hairy, and the body has several longitudinal series of short conical spines; there are two of these spines on the second segment, four on the third, and six on the following segments; the thirteenth segment has but two, and these are directed backwards: the colour of the head is brown, of the body brown, with a mediodorsal stripe of a dirty white and a side stripe of nearly the same tint, but more inclining to yellow. The spines are yellowish white.—*Sepp's Figure.*

Obs.—I know nothing of this caterpillar except from books.

Time of Appearance.—September.

Localities. — This common continental species has always been considered, and still remains, a great rarity in this country: the English localities are rather numerous, but the number of specimens captured is very small: the maritime position of most of the localities suggests the idea of the specimens having migrated from the Continent: Dover, Ramsgate, Folkstone, Ventnor, &c., seem to support this conclusion; while others, such, for instance, as the celebrated locality at Birch Wood, are so truly inland that we cannot hesitate to believe that the specimens have been bred on the spot where they were captured. I think we may fairly conclude that, like many of our resident birds, such as the goldfinch and skylark, of which thousands of dozens are annually captured on their arrival on our southern coasts, that accessions to the number of Lathonias take place every year. Mr. Birchall informs me that "a single specimen was taken at Killarney, in Ireland, on the 10th of August, 1864, in the lane leading from Muckross to Mangerton, near a limestone quarry on the left of the road;" a very important and interesting fact, since no doubt can now be entertained of the species existing in the Killarney district in a perfectly natural state, although the constant humidity of the atmosphere may interfere with its appearance on the wing. From Scotland I have no report of its occurrence. I record a few of the instances in which the species has been taken in England: they are chiefly extracted from the "Entomologist."

Cambridgeshire. One specimen was taken in 1844 by the side of the road near Newmarket, and one near Fulbourn, the same year, in September—*Thomas Brown.*

Devonshire. One specimen in Roseberry Wood, near Exeter—*Thomas Lighton.*

Essex. I have taken four in different years in the neighbourhood of Colchester, and have seen three others taken, two of them by one of my brothers; Mr. W. Harrington and Mr. Robert Halls have each taken single specimens; others have been taken at Berechurch by the late Dr. Maclean and Mr. Lawrence Black—*W. H. Harwood;* one at Braintree on the 19th September, 1865—*B. Holland;* one at Bury-St.-Edmunds—*A. H. Wratislaw;* three at Southend—*J. Russell.*

Dorsetshire. Two specimens at Swanage in the summer of 1852—*Henry Reeks.*

Hampshire. Ashford, near Petersfield—*H. H. Crewe.*

Kent. One specimen at Easting, and another on Breeze Hill, near Canterbury—*W. O. Hammond;* eight specimens on the flowers of the broad-leaved hawkweed (*Hieracium sabaudum*) near Birch Wood—*B. Standish;* three of these were taken in one year—the others only one during each year; I have often looked for the insect in the same spot when the hawkweed was in bloom but without success—*E. Newman;* twelve specimens on the blossoms

of thistles in open parts of a wood near Shoreham—*Thomas Price.* Mr. Price presented three of these to the late Thomas Ingall, in whose cabinet I have often seen them—*E. Newman;* three near Dover in the autumn of 1846—*J. J. Weir;* one in a chalk-pit at Cliff's End, about two miles from Ramsgate, on the 17th of September, 1864—*J. J. Weir;* one in a meadow at Darenth Wood, on the 16th August, 1868—*E. Harper;* one at Gravesend on clover blossom, on the 2nd of September, 1868—*D. T. Button;* one at Ramsgate on the 2nd of August, 1868—*W. G. Armstrong;* two the second week in September, 1868, near Margate—*E. Newman;* thirteen near Canterbury the first week in September, 1868—*George Parry;* one at Walmer—*F. O. Standish;* three between Dover and Deal, October, 1868—*H. E. Leslie;* one at Folkstone, 7th September—*Mr. Purdey;* one at Milton, near Gravesend, the latter part of September, 1868—*H. J. M. Todd.*

Norfolk. One specimen at Great Yarmouth—*C. J. Paget;* one at Ormsby—*C. G. Barrett;* one near Norwich—*C. G. Barrett;* two good specimens in October, 1846, at Harleston, near Norwich—*Charles Muskett;* one specimen at Plumstead, near Norwich, on the 2nd of October, 1865—*T. E. Gunn.*

Suffolk. One specimen on the 3rd Sept., at Lavenham, on a small and almost barren bit of pasture land; it was sitting on the blossom of a dandelion; the soil was heavy clay—*W. Gaze;* A. Lathonia was taken by Captain Russell on two occasions, in August, 1859; in the first instance five specimens, in the second two, in a meadow-field on the south-west side of a wood belonging to Mr. T. P. Hitchcock, at Lavenham: the specimens were shown to the late Professor Henslow, whose living of Hitcham is in an adjoining parish; the professor told him they were certainly Lathonia, but added he did not consider them indigenous, but thought they must have been blown over from the Continent—*Report of Entomological Society*, Feb. 3, 1862; one in a clover-field, near Ipswich, August, 1868—*Garrett Garrett;* one at Stowmarket, in August, 1868—*W. Baker;* one in a clover-field, at Hazlewood, near Aldeburgh, on the 3rd September, 1868—*N. Fenwick Hele.*

Surrey. Mickleham—*William Bennett;* one at Croydon the second week in August, 1868—*E. Newman.*

Sussex. Two taken near Brighton three or four years ago—*Edwin Hellard.*

Wight, Isle of. I took a very fresh specimen on the 20th of October, 1865, in my garden at Sandown, and have heard that four others have been taken at Ventnor since that date—*W. M. Frost;* one at Ventnor on the 21st of October, and another at the same place on the 24th; on the 4th of November, two in the same line of cliff as those last mentioned—*Alfred Owen.*

Yorkshire. One specimen on the west side of Oliver's Mount, Scarborough, in September, 1868—*J. H. Rowntree;* one near York—*Edwin Birchalt.*

6. Pearlbordered Fritillary (*Argynnis Euphrosyne*). Upper side.

Under side.

6. Pearlbordered Fritillary.—The costal margin of the fore wings is slightly arched, the tip blunt, and the hind margin very slightly convex; the colour of the upper surface is bright sienna-brown spotted with black: the under side of the fore wings is tawny, approaching to yellow towards the tips, and

adorned with black spots; the underside of the hind wings is tesselated with red-brown, yellow, and silver spots; the silver spots are nine in number, the largest and longest of which is central; there is one close to the body, near the base of the wing, and there are seven semicircular ones forming a continuous series round the hind margin.

Life History.—The females may be observed during the months of May and June busily employed in examining the leaves of the dog-violet (*Viola canina*), for the purpose of selecting one exactly adapted to their taste for the deposition of their eggs. The egg has been observed by many entomologists; but I have never had the good fortune to possess one, and therefore adopt the description lately published by Mr. Buckler, who, in describing the egg, says it is "of a blunt conical shape, with its lower surface, which adheres to the leaf, flattened; its sides are ribbed: at first it is of a dull greenish yellow colour, becoming afterwards brownish. Towards the end of June the caterpillar is hatched, then being of a pale greenish tint; after its first moult it becomes browner green, and about the middle of July attaches itself to the stem of the plant, and ceases to feed." Mr. Buckler failed in keeping the caterpillar through the winter, but delayed the hybernation of one individual until the end of July by keeping it in a hot sunny window: "it was then half an inch long, black and spiny, with a faint indication of a dull whitish stripe along the sides above the feet." At this stage the caterpillar was killed by mould, and Mr. Buckler's observations unhappily terminated. On the 9th of April, 1868, through the kindness of Mr. G. F. Mathew, of H.M.S. "Britannia," I received a supply of full-grown caterpillars feeding on the leaves of the dog-violet (*Viola canina*), and have thus enjoyed the opportunity of making a careful description. Mr. Mathew informs me they are by no means easy to find; they are seldom to be seen on their food-plant, but generally on a dead leaf in its immediate neighbourhood or a twig above it. They are lively and feed freely when the sun is on them; but they move slowly and feed sparingly when the weather is dull, and at night they are motionless and abstain from food altogether. The full-fed caterpillar rolls in a ring when annoyed, but very soon unrols, and crawls with considerable rapidity to a place of supposed safety: the head is almost exactly of the same width as the second segment, rough and bristly; the face is flattish and the crown notched: the body is obese, and the segmental divisions are marked with considerable distinctness; the second segment has two dorsal spines directed forwards; between the second and third segments there is a lateral spine directed outwards; on the third segment are two dorsal spines nearly erect; between the third and fourth segments is a lateral spine directed outwards; on the fourth segment are two dorsal spines nearly erect; the fifth and following segments, as far as the twelfth inclusive, have six spines each—two dorsal, and two on each side lateral; the thirteenth segment has four spines directed backwards; all the spines are rough and uneven, especially towards the tip, and are beset with strong bristles; there is no medio-dorsal series of spines, but the dorsal spines constitute two series of eleven each. The colour of the head is black, the two dorsal series of spines are gamboge-yellow at the base and black at the tip; the body is black, very slightly sprinkled on the back with white dots, and having a vague but broad pale stripe on each side, composed of irregular bluish white markings, more or less closely crowded, and each generally having a median black dot: this stripe is often intersected by a slender sinuous black line: the legs are black, the belly and claspers pitchy red. On the 17th of April my specimens spun little silken pads on the grass, and from these suspended themselves in the usual manner and became chrysalids. The chrysalis is obese, the head obtusely eared, the thorax broadly keeled, the wing-cases ample, the anal extremity rather abruptly incurved, almost reaching the end of the wing-cases, blunt, and terminating in two nearly circular disks, which are fringed with very numerous minute hooks; the dorsal surface has two warts on every segment as far as the eleventh inclusive;

these seem to be the dorsal spines simply dwarfed, and denuded of their dermal envelope and bristles, which are shed with the rest of the larval covering. The segmental divisions of the chrysalis are clearly defined; the prothorax or collar is narrow, the tippets have each a separate case, terminating in a rather sharp transverse ridge or keel at the base of the fore wing; the mesothorax is very broad, and occupies the same conspicuous position as in the butterfly; the metathorax is rather narrow, and its anterior margin is broadly excavated, the excavation being semicircular; the fourth and fifth segments are narrow, and the remainder have the dorsal area well developed, but the ventral area almost entirely concealed by the wing-cases. The peculiar coloration and situation of spines which I have described in the caterpillar are continued in the chrysalis, so that the larval and pupal segmental divisions in the two can be identified with the utmost precision; the general colour of the chrysalis is gray-brown, the wing-cases having two series of paler dots.—*Newman.*

Time of Appearance.—The caterpillar lives through the winter at the roots of herbage in woods, or under dried and fallen leaves: the chrysalis is to be found on the dog violet in April and May, and the perfect insect flies in May and the beginning of June.

Localities.—One of the very commonest of wood butterflies in England: it is included in every county list I have received through the kindness of correspondents, except Derbyshire, and in a very ingenious table compiled by Mr. Jenner Fust, and published in the "Transactions of the Entomological Society," it appears in all the numerous sub-provinces into which he has divided Great Britain, with the single exception of Cornwall, in which county, however, the species abounds in some localities, such, for instance, as St. Martin's Wood, near Looe, where it is taken by my valued correspondent, Mr. Clogg. It swarms in the London district, as in Darenth and Birch Woods, and is equally abundant in Northumberland and Durham. I am not aware of its having been found in Ireland, but I have fine examples from Scotland, where it has been taken by Dr. Syme, Mr. Birchall, Mr. Eccles, Mr. Chapman, Dr. Buchanan White, and others. The last named gentleman says:—"It does not appear to be a common species in Perthshire; it has been found in Scone Woods, near the locality for *Moneses grandiflora*, and at the Bridge of Allan. It seems to be more common in the northern than in the southern parts of Scotland, occurring in the same kind of places as *Argynnis Selene*, but generally making its appearance earlier in the season, in fact, about the middle of June; when Selene is most abundant, the flight of Euphrosyne is nearly over.—1868, June 5; 1869, June 4."

7. Small Pearl-bordered Fritillary (*Argynnis Selene*). Upper side.

Under side.

Under side of a Variety in the cabinet of Mr. Bond.

7. Small Pearl-bordered Fritillary.—The costal margin of the wing is slightly arched, the tip rounded, and the hind margin convex. The colour of the upper surface is bright sienna-brown, spotted with black: the underside of the fore wings is tawny, approach-

ing to yellow towards the tip, and having a large red-brown blotch in this yellower part; the wing is adorned with black spots; the underside of the hind wings is tesselated with red-brown, yellow, black, and silver spots—the silver spots are seventeen in number, the largest of which is central; seven nearly triangular ones form a regular series round the hind margin; there are five between the central one and the costal margin, and five more between the central one and the hind margin: the various spots, whatever their colour, are very distinctly margined with black.

Life History.—The egg is laid on the dog violet (*Viola canina*) in the summer. I have seen the females busily employed in this occupation in the mouth of June; the young caterpillars emerge in July and August, and hybernate at the roots of herbage. In spring they are found feeding on the leaves of the violet, and are full grown in May: they are then scarcely an inch in length, the head is about the same width as the second segment, and the body almost uniformly cylindrical, and furnished with six longitudinal series of rather short spines, each of which emits some short bristles, especially from about the tip. The colour of the head and body are dark brown approaching to black, the spines being pale on the basal portion, but black towards the tip. The chrysalis is attached to the stem of the violet leaf, is of a brown colour, and has short conical spines on the segments of the body evidently representing those of the caterpillar.—*Hubner's figure, &c.*

Obs.—I have never possessed this caterpillar, and have, therefore, been compelled to rely on books for my description.

Time of Appearance.—In the Kentish woods I have always found that this butterfly makes its appearance from ten to twenty days later than Euphrosyne. I have taken it on the 1st of June, but it is more abundant about the 8th or 10th.

Localities.—This species is neither so abundant nor so universally distributed in England as Euphrosyne. I have seen no Irish specimens, and none from the Isle of Man; but in Scotland it is more common and more widely distributed than Euphrosyne. Dr. Buchanan White observes it is a common species throughout Perthshire in marshy places, in woods, and on hill-sides: it is probably found in every county in Scotland, where it holds the same place as *Argynnis Euphrosyne* in England.—1858, June 6; 1859, June 7; 1860, July 12; 1867, June 19; 1868, May 16; 1869, June 23." The undermentioned English localities may be noticed:—

Berkshire. Burghfield, near Reading—*C. S. Bird.*

Buckinghamshire. Drayton-Beauchamp, Aston Clinton, Buckland, Claydon—*H. H. Crewe;* Halton—*Joseph Greene.*

Cambridgeshire. Near Cambridge—*F. Bond.*

Cornwall. Abundant in St. Martin's Wood, near Looe—*Stephen Clogg.*

Cumberland. Abundant in Barron Wood and in many other localities—*J. B. Hodgkinson.*

Devonshire. Newton Abbot—*J. Hellins.*

Dorsetshire. Glanville's Wootton (but rare of late years), Parley, &c.—*J. C. Dale.*

Durham. Appears abundantly about June, and frequents most of our woods, Gibside, Meldon Park, &c.—*George Wailes;* Common at Shull—*William Backhouse.*

Essex. Epping—*E. Doubleday;* Colchester, but not so common now as formerly—*W. H. Harwood.*

Glamorganshire. Common at Llantrissant—*Evan John;* Common at Ynisygerwn—*J. T. D. Llewelyn.*

Gloucestershire. Forest of Dean—*J. Merrin;* Park Wood, near Stroud—*M. G. Musgrave;* Guiting—*Joseph Greene;* Bristol—*Alfred E. Hudd.*

Hampshire. Lyndhurst and Brockenhurst *F. Bond;* Grange, Butsee Hill, &c.—*H. Moncreaff;* Bramshott—*C. G. Barrett;* in the county, but not so common as Euphrosyne—*G. B. Corbin.*

Herefordshire. Occurs frequently on the outskirts of our woods at Leominster—*Mrs. Hutchinson.*

Hertfordshire. Near Shirley—*F. Bond.*

Huntingdonshire. Monkswood, 8th June, common—*J. H. White.*

Kent. Very common in all the Kentish woods at the beginning of June; as West Wood, Shooter's Hill, Birch Wood, Joynson's Wood, Darenth Wood, &c.—*E. Newman;* Fork Common, near Sevenoaks—*G. H. Raynor;* on the large woodlands between Barham Downs and the hills extending from Folkstone to Wye—*W. O. Hammond;* in every wood about Faversham and Canterbury—*H. A. Stowell.*

Lancashire. Abundant—*J. B. Hodgkinson.*

Lincolnshire. Common—*T. H. Allis.*

Middlesex. Scratch Wood, near Edgware—*F. Bond.*

Monmouthshire. Common—*George Lock.*

Norfolk. Near Norwich—*C. G. Barrett.*

Northamptonshire. Near Wadenham—*F. Bond;* near Towcester—*Hamlet Clark.*

Northumberland. Near Hexham—*William Maling.*

Nottinghamshire. Very common at Mansfield—*R. E. Brameld.*

Somersetshire. Brockley, Clevedon, and many other places—*A. E. Hudd.*

Staffordshire. Burnt Wood—*Rev. T. W. Daltry;* Charnwood Forest—*Edwin Brown.*

Suffolk. Coomb, Bentley, &c.—*H. H. Crewe;* Brandeston and Playford—*Joseph Greene;* Sudbury—*W. D. King.*

Surrey. Haslemere—*C. G. Barrett.*

Sussex. Very abundant in woody parts of the Weald, Plashet, Abbot's Wood, &c.—*E. Jenner;* Harting Coombe—*W. Buckler;* Frenchlands—*J. H. White.*

Warwickshire. Rugby—*G. B. Longstaff.*

Westmoreland. Witherslack, abundant—*J. B. Hodgkinson.*

Wight, Isle of. Ryde, Sandown, Parkhurst, Quarr Copse, &c.—*Alfred Owen, James Pristo.*

Wiltshire. Savernake Forest—*T. A. Preston.*

Worcestershire. Monk's Wood, common—*J. E. Fletcher.*

Yorkshire. Near York, plentiful on moors and in fir plantations near Cloughton—*J. H. Rowntree;* Scarborough—*Edwin Birchall.*

Family 2.—Gregarious Fritillaries (in science *Melitæidæ.*)

The caterpillars are almost uniformly cylindrical and almost uniformly spiny, but the spines are short and blunt: they are gregarious through the autumn, winter, and early spring, feeding in company, under a web of their own construction, on the leaves of various species of germander (*Teucrium*), speedwell (*Veronica*), cow-wheat (*Melampyrum*), plantain (*Plantago*), scabious (*Scabiosa*), and other low-growing plants: most of them are confined to one food-plant, but others are equally common on three or four different species. The chrysalids are suspended among the leaves or on the stems of the food-plants, often in little companies of eight or ten together; they are almost without angles, stout, blunt-headed, and remarkable for their beautiful ornamentation of black and orange spots on a whitish ground. The perfect insects have knobbed antennæ; the costal margin of the fore wings is straight, or nearly so, and the flight languid. The colour of the upper surface of the wings is brown, generally of one shade, but sometimes of two, and invariably spotted with black; the underside of the hind wings is tesselated with browns and yellows. They are remarkable for their adherence to very limited localities, most of them spending their lives within a few yards of the spot where the eggs from which they were produced were deposited by their parents. Like domesticated pigeons, they take their little trips about their homestead, but have no propensity to forsake its immediate neighbourhood. We have but three species in this country, all of them at present included in the genus *Melitæa*, but the first species will probably be separated on account of certain peculiarities in the structure of its scales.

8. Greasy Fritillary (*Melitæa Artemis*). Upper side.

Under side.

8. Greasy Fritillary.—The costal margin of the fore wings is almost straight, the tip rounded, and the hind margin rather convex. This species has three colours on the upper surface; burnt sienna brown, dull yellow, and black: the hind margin is black, surmounted in the hind wings by a series of six pale yellow crescents, each bordered with black; above, and adjoining these, is a broad brown band, divided into compartments by the black wing-rays, and in each of these compartments there is an obscure yellow spot in the fore wings, and a black spot in the hind wings. The underside has a greasy appearance, as though oily, or as if the scales had been rubbed off; the underside of the fore wings is dingy brown tesselated with dull black, of the hind wings reddish brown tesselated with dull yellow, each yellow spot being bordered by a black line; parallel with the hind margin is a series of six black dots, each of which is obscurely surrounded with yellow.

Life History.—The eggs, which are somewhat flattened on the crown, are laid on the under side of the leaf of devil's-bit scabious (*Scabiosa succisa*), those leaves nearest the ground being selected for this purpose; the usual period of oviposition is from the beginning to the middle of June. In about a fortnight—that is, from the middle to the end of June—the young caterpillars emerge; they have then black heads and ochre-coloured bodies: almost immediately after emergence they begin drawing together two or three leaves of the scabious or of the neighbouring herbage, and spin a slight gauzy web over the interstices; enclosed in this domicile, they devour, in company, the underside of a scabious leaf, leaving only the epidermis, which very soon becomes brown in blotches: as soon as the little community has extracted all the nutriment from the leaf or leaves included within the first enclosure, it moves to other leaves, and by united labours the caterpillars construct a much larger dwelling, sometimes even extending over the leading stem and enclosing the flowering stem of the scabious with its apical flower-bud. Towards the end of summer the caterpillars, then scarcely half-grown, become sluggish, and, ceasing to eat, descend low down among the herbage, where they again spin a silken domicile, beneath the shelter of which they pass the winter: as soon as the plant begins to grow in the spring these caterpillars break up their winter establishment, and each seeks its own provisions independently of the others, and without the protection of a web; indeed, they seem quite fearless of exposure, often indulging in a noonday siesta in bright sunshine on a dried leaf, or in any other exposed situation; this continues until the end of April, when, being full fed, the caterpillar existence terminates: at this period the creature rests in a straight position, but falls off its food-plant when touched or disturbed, and forms a loose ring, the head tucked in and the anal extremity protruding. The head is scarcely narrower than the second segment, semiporrect, and garnished with stiff bristles: the body is obese, and the incisions of the segments are well marked; the second segment has two short bristly obtuse spines on each side below the spiracles; the third and fourth segments have each eight spines; the fifth and succeeding segments have each nine spines, the additional spine being mediodorsal, and the aggregate of these mediodorsal spines forming a mediodorsal series; all the spines are short, obtuse, scabrous, and furnished with bristles. The colour of the head is black; of the body velvety black, sprinkled with circular white dots, which are irregularly ranged in three principal but ill-defined series; one mediodorsal, the others spiracular; each white dot emits a black bristle from its centre; the legs are black; the claspers pale smoke-coloured. It is worthy of remark that in a large number

of these caterpillars under my notice nine out of every ten were infested by ichneumonideous parasites; these emerged from the lepidopterous caterpillars in the caterpillar state, and spinning little silken cocoons outside the lepidopterous caterpillar, fastened down the wretchedly atrophied but still living victim, and, fixing it immovably, left it to perish miserably: the number of these parasites in each caterpillar varied from ten to twenty-six; the cocoons which they spun were of a pale sulphur colour, and were elongate-oval in shape: the majority of them emerged between the 18th and 25th of May, and proved to be a species of *Microgaster*. It would appear that but a small proportion of the caterpillars of *Melitæa Artemis* escape this formidable parasite. The full-fed caterpillar of *Artemis* generally selects some curled leaf or mass of tangled herbage, and thus concealed, spins a slight silken coating over the surface of the object selected, and suspending itself by the anal claspers, changes to a chrysalis, which hangs in the same way. The CHRYSALIS is short and obese, the head being transversely produced in front and broadly truncate; the base of each wing-case is slightly produced: the back is very convex, its anal extremity bent under towards the extremity of the wing-cases, and the dorsal outline being almost semicircular; the caudal extremity is attached by its little hooks to a slight web spun about the margin of the scabious leaf: the colour of the chrysalis is creamy white, changing, as the time of metamorphosis approaches, to a deep orange, variegated with black and orange markings; the cases of the legs have black markings only, but those of the antennæ are black and orange alternately, the latter colour in very small dots; the back of the thorax has two conspicuous black lunate marks, each having a yellow dot behind it: the eight abdominal segments have each a transverse series of lunate black markings, and behind each of these, and partially enclosed by it, is a bright yellow spot with a nipple-shaped excrescence in the middle; the wing-cases are adorned with black markings. Prior to the final change the chrysalis assumes a darker and richer hue, approaching to dull orange, and exhibiting beneath the wing-cases the colours of the butterfly. I am indebted to Mr. Merrin, of Gloucester, for a liberal supply of this very imperfectly-known caterpillar: the same gentleman has most kindly furnished me with materials for compiling its history.—*Newman.*

TIME OF APPEARANCE.—The butterfly makes its appearance in about fourteen days after the change to a chrysalis; this period, however, depends in some measure on the temperature, a cold April delaying their final change for a few days: if the spring is warm and vegetation forward, the caterpillars have a better chance of feeding up early, and the male butterflies begin to appear the second week in May, most of the females emerging some days later: this butterfly has a slow and gentle flight, and is very easily captured; it delights in damp meadows, and is fond of resting in the sunshine on leaves and flowers with expanded wings, and apparently enjoying the warmth: in cloudy weather it will allow itself to be taken by the hand from a flower on which it is resting, and at no time does it fly to any considerable distance from its birthplace: in the damp meadows near Leominster it occurs year after year in the same spot, and may be met with from the middle to the end of May with the greatest certainty.

LOCALITIES.—Frequents damp meadows in which the devil's-bit scabious grows, and is very widely distributed, but at the same time very local: it may exist in all the English and Welsh counties, but from this peculiarity have escaped notice. I have enumerated a few of the localities below. In Ireland, as I am informed by Mrs. Battersby and Mr. Birchall, it is common, occurring in the county Wicklow, also in Galway and at Killarney; and is abundant at Glen Lough and Cromlyn Bog, in Westmeath, where it is very highly coloured and very various in size; in Scotland it seems rare and local, but has been taken at Dunoon and Oban by Mr. Chapman. Dr. Buchanan White says it has hitherto been found in very few localities in Perthshire, but thinks it probable that it has often been overlooked owing to its very local habits. It has

been taken near Dunsinane, Methuen, and the Bridge of Allan. In the first of these localities the caterpillars have been collected rather commonly. In Scotland it occurs as far north as Forres. Dr. White thinks that Scottish specimens are slightly smaller and darker than English ones. The following are English localities :—

Berkshire. Burghfield, near Reading—*S. C. Bird.*

Buckinghamshire. Drayton-Beauchamp, *H. H. Crewe;* Halton—*Joseph Greene.*

Cambridgeshire. Ely—*Marshall Fisher;* Whittlesford and in the Fens—*F. Bond;* (it was formerly common near Cambridge, but has not been seen for some years)—*Thomas Brown.*

Cheshire. Near Eastham, but rare—*Edwin Birchall.*

Cumberland. Common in the county; Worton Moss, Newby Cross, and abundant also at Brick House, Sabergham. The caterpillar from this bleak place produces very small dark specimens, and also some beautiful varieties with large canary-coloured spots on the fore wings—*J. B. Hodgkinson.*

Derbyshire. Cromford—*H. H. Crewe.*

Devonshire. Near Exeter—*J. Hellins;* woods at Ivybridge, and near the viaduct at the extreme end of the wood—*G. C. Bignell.*

Dorsetshire. Glanville's Wootton, Middlemarsh Woods, Parley, and other places—*J. C. Dale.*

Durham. Near Castle Eden Dene—*W. Maling;* in the Floss locality, I am informed by Mr. Proctor, Jun., of the Durham Museum, that it is most abundant, the food-plant, the devil's-bit scabious, growing there in great quantity—*George Wailes.*

Essex. Near Epping—*E. Doubleday;* about Colchester, but not nearly so common as formerly—*W. H. Harwood;* Saffron Walden, *W. R. Jeffrey.*

Glamorganshire. Common near Llantrissant—*Evan John;* sparingly in short hay meadows about Ynisygerwn—*J. T. D. Llewelyn.*

Gloucestershire. Near Gloucester, but very local—*J. Merrin;* Guiting—*Joseph Greene;* Clifton—*Alfred E. Hudd.*

Hampshire. Warblington—*W. Buckler;* Brockenhurst—*F. Bond;* Woolmer Forest—*C. G. Barrett;* common near Fordingbridge—*G. B. Corbin.*

Herefordshire. Not common near Leominster—*Mrs. Hutchinson;* I have met with it occasionally in all the damp meadows near Leominster, but not abundantly. I have observed it more particularly in the Caswell fields—*E. Newman.*

Huntingdonshire. Yaxley—*F. Bond.*

Lancashire. Rare—*J. B. Hodgkinson.*

Lincolnshire. Common in the county—*T. H. Allis.*

Middlesex. Kingsbury—*F. Bond.*

Monmouthshire. Very common near Heullis' and St. Julian's Woods—*George Lock.*

Norfolk. Near Aldeby, but confined to a few marshes—*W. M. Crowfoot.*

Northamptonshire. Aldwinkle, near Wadingham—*F. Bond;* near Towcester—*Hamlet Clark.*

Oxfordshire. Stow Wood and Bayley Wood—*W. H. Draper.*

Somersetshire. Clevedon—*A. E. Hudd.*

Staffordshire. Craddock Moss—*T. W. Daltry;* Charnwood Forest—*Edwin Brown.*

Suffolk. Near Stowmarket—*H. H. Crewe;* Brandeston and Playford—*Joseph Greene;* Haverhill—*W. Gaze.*

Surrey. Haslemere, irregularly—*C. G. Barrett.*

Sussex. Foxborough Marsh—*W. Buckler;* abundant in the forest near Wych Cross—*E. Jenner.*

Westmoreland. Rare at Witherslack—*J. B. Hodgkinson.*

Wight, Isle of. Very local, but abundant where it occurs, damp meadows—*James Pristo;* Ventnor—*Alfred Owen;* Sandown—*F. Bond.*

Wiltshire. Clatford, and near Great Bedwyn—*T. A. Preston.*

Worcestershire. Meadows at Hambleton and Oddingley—*J. E. Fletcher;* formerly abundant at Great Malvern, but seems to have disappeared since the drainage—*W. Edwards.*

Yorkshire. Near York—*Robert Cook.*

9. Glanville Fritillary (*Militæa Cinxia*). Upper side of Variety in the cabinet of Mr. Owen.

Under side.

Under side of a Variety in the cabinet of Mr. Bond.

Under side of a Variety in the cabinet of Mr. Wellman.

9. Glanville Fritillary.—The costal margin of the fore wings is very nearly straight, the tip rounded, and the hind margin very slightly convex; the hind margin of the hind wings is waved; the colour of the upper surface of all the wings is rich fulvous brown; the fore wings have several short bands at the base, four transverse irregular zigzag bars parallel with the hind margin, and all the rays black; the intersection of the transverse bars and longitudinal rays dividing the brown colour into several series of compartments of different figures: the hind wings have much the same character, except that each of the brown spots in the second row, counting from the hind margin, has a black dot in the middle; the fringe is alternately black and yellow, the yellow colour being excessively delicate, often approaching to white even in recent specimens, but in faded specimens it appears white: the underside of the fore wings is fulvous, the tip yellow, with a few black markings: the underside of the hind wings is yellow, with two very irregular transverse fulvous bands; in the yellow base of the wing are six black dots; then follows the first fulvous band very much contorted, and its margin bounded by a black line; next comes a yellow band, in which are six or eight black dots; then the second fulvous band, margined like the first with black, and containing seven black dots; lastly, the marginal band is yellow, and contains six or seven crescent-shaped black marks.

The variety of the under side is so excessive, and, indeed, so bizarre, that any description must fail to give a correct idea of any individual specimen; but when the entomologist has an ample row of the insect before him, I trust he will find the description applicable. I am indebted to Mr. Bond, Mr. Owen, and Mr. Wellman for the loan of the beautiful varieties figured.

Life History.—The eggs are laid during May and June in batches on the narrow-leaved plantain (*Plantago lanceolata*), on which plant alone have I seen the caterpillar feeding. At this time of year I found this butterfly in profusion on the side of and beneath the cliff at Sandown in the Isle of Wight. Many males were settling on the flowers then abundantly scattered along the undercliff, but the females seemed to be almost invariably occupied in the duties of oviposition. Mr. Dawson has added some interesting particulars, which I shall presently give in his own words. The caterpillars are extruded from the egg in August, and after feeding for a month or two,

the time being longer or shorter according to the weather, they spin a tent, under shelter of which they pass the winter. This tent is very compact and almost of a globular figure, the caterpillars in each mass varying considerably in number. I have found between fifty and sixty in a single mass, but in other masses not more than a dozen. The web is very ingeniously constructed, as Mr. Dawson has described; the blades of grass, as well as the leaves and flowering stems of the plantain being inwoven, and thus rendering the mass firm and compact. The caterpillars when examined in the winter are about a third of an inch in length, and directly they are disturbed roll up into little balls. In the spring they leave their winter quarters, and then may be seen migrating towards the higher part of the cliff, where they feed on the same species of plantain, but not so much in company, nor have they any longer the protection of a web. When full fed they fall off the food-plant and roll into a tight compact ring if disturbed. The head is distinctly exserted and distinctly notched on the crown. It is hairy, and obviously narrower than all the other segments, except the second and thirteenth. The body is obese and slightly decreasing in size at the extremities, the incisions of the segments being distinctly marked. On each segment are eight warts in a transverse series, and each is prolonged into a pointed conical process with rugose surface, and seated in the midst of a fascicle of short stiff radiating bristles. The head is red and shining, its hairs black: the body is intense velvety black, with belts of pure white dots in the incisions between the segments; its hairs are intensely black; the legs are pitchy black; and the claspers dull red. At the end of April it attaches itself by the tail to the stem of the plantain, almost close to the ground, and there changes to a short stout chrysalis, which is of a very dark colour and almost smooth. I have found dozens of the chrysalids in company. The insects remain but a short time in the chrysalis state, rarely more than a fortnight, sometimes less.—*Newman.*

Time of Appearance.—The caterpillar lives through the winter; the chrysalis is found at the end of April and beginning of May, and the butterfly continues to emerge and appear on the wing during the whole of May and June; but it is undesirable to define too closely the duration of either state, for when I had the pleasure in 1824, in company with my friends, George Waring, of Bristol, and Waring Kidd, of Godalming, of discovering the now celebrated locality at the Undercliff, Isle of Wight, we found the caterpillars, chrysalids, and butterflies equally abundant at the same time. With a feeling of triumph that I well recollect I recorded the discovery of this beautiful butterfly in the pages of "London's Magazine of Natural History," then in the zenith of its glory, now a mere memory of the past. Twenty years later, the Rev. J. F. Dawson sent me a most interesting account of the same butterfly and the same locality, and I will copy his letter here even at the risk of some little repetition.

"As this fritillary is rare in almost every part of the kingdom, some account of its favourite haunts and habits may not prove uninteresting. It cannot be accounted by any means common here, being confined to a few localities only, though where it does occur, it is in general to be found in some abundance. It is not to be expected in cultivated districts, but breeds on steep and broken declivities near the coast, which the scythe or the plough never as yet have invaded, and in such spots it may be met with, earlier or later in May, according to the season. Near Sandown, on the side of the cliff, there is one of these broken declivities, occasioned by some former land-slip, covered with herbage, which slopes down to the beach. A pathway leads to the base. On the 9th of May, 1844, a hot, sunny day, each side of this pathway was completely carpeted with a profusion of the yellow flowers of the common kidney vetch or ladies' fingers (*Anthyllis vulneraria*, var. *maritima*), when I visited the spot; and these flowers were the resort of an abundance of these fritillaries, which fluttered about them, or rested on their corollas, expanding and sunning their wings, and presenting a most charming picture of

entomological loveliness. The great abundance of the narrow-leaved plantain, which also grows there, affords food for their caterpillars. The spring of last year (1845), on the other hand, was so very backward, that on visiting that locality at a date some fortnight later than the above, so far from either flowers or butterflies being visible, the caterpillars were still feeding, and I could discover but few chrysalids. These latter are found adhering, just above the surface of the ground, to the knotted stems of the plantain, which here consists of aged plants, each with but a few stunted leaves; and occasionally on the under-side of large stones which have fallen from the cliff; and they are suspended and partly surrounded in the latter case with a fine web. They are also generally to be found in pairs. The caterpillars evidently prefer these stunted plants, for at the base of the declivity, where the plantain grows luxuriantly, not one is to be seen. They are black and spiny, with red heads and legs; being hatched in August they pass the winter in societies, under a kind of tent, formed by a compact web, brought round and over the stems of grasses. I have found several of these societies on the 27th of August, the individuals which composed them being about a quarter of an inch long, rolled up like little balls. All these societies occurred at the base of the declivity, where the herbage grows most luxuriantly; and when the caterpillars have attained sufficient strength in the spring, they are invariably seen ascending towards the higher parts of the slope. And herein I imagine that I recognize a beautiful instance of natural instinct, both in the butterfly and caterpillar. The former deposits its eggs low down in the declivity, where the young brood may rest most securely, sheltered and least exposed to the wintry storms; but when the caterpillars are sufficiently advanced in growth, they ascend to the higher parts of the steep, and feed and undergo their transformation. Were the chrysalis formed below, they would probably have too much moisture and too little sun; whereas, by being formed higher up, they have a sufficiency of both to bring them to maturity. This butterfly is single brooded; but there is a succession of them, varying in duration according to the season. The earliest date on which I have met with it is May 1st—the latest in July; but in the latter case the specimens were bred in captivity. I never remember to have seen it so late in the state of liberty; not later, indeed, than the middle of June here. They are very difficult to rear from the caterpillars, and those I have bred are not only disclosed much later than in the state of freedom, but are not nearly so fine and perfect. They in general fly slowly and gracefully, except when alarmed, gliding gently from flower to flower. I have taken as many as two dozen without moving from the spot where I stood, as they successively visited the stems of the grasses round me. This fritillary was much less plentiful last season than heretofore; and in some of its former haunts has quite disappeared. It has many foes; for besides the march of improvement in cultivation which gradually invades its haunts, the same natural causes which promote its abundance also multiply its enemies. Two necrophagous beetles, *Silpha obscura* and *S. tristis*, destroy the caterpillar; and a large ground spider, very numerous in the spots which it frequents, feeds on the perfect insect; it lies in wait till the butterfly alights on the low plants, or on the ground, then rushing forward, seizes it by the neck, and holds it captive with such tenacity, that both insects may almost be pulled in pieces ere it will relax its grasp."

Time of Appearance.—The caterpillar lives through the winter; the chrysalids are to be found in May and June, and the butterflies are on the wing in the same months.

Localities.—Few species of butterfly are more restricted in their range than this. I know of but three counties where it has been found, as under:—

Hampshire. Near Brockenhurst, in the New Forest—*J. C. Dale.*

Kent. Cliffs near St. Margaret's Bay—*W. O. Hammond.*

Wight, Isle of. Undercliff, near Sandown, discovered by *E. Newman* in 1824; Sandown—*J. F. Dawson* in 1844; plentiful in the

chalk, also occurs on the tertiaries—*James Pristo;* Brook Chine—*F. Bond;* Ventnor and Newport — *Alfred Owen;* Carisbrook Castle, Blackgang Chine, and Freshwater—*J. C. Dale.*

Wiltshire. Near Great Bedwyn, very rare, Rev. J. W. Lukis—*T. A. Preston.*

10. Heath Fritillary (*Melitæa Athalia*). Upper side.

Upper side of a Variety in the cabinet of Mr. Bond.

Two Upper sides and one Under side of Varieties in the cabinet of Mr. Bond.

Under side.

10. The Heath Fritillary.—The costal margin of the fore wings is very slightly arched, the tip rounded, and the hind margin rather convex; the hind margin of the hind wing is waved; the colour of the upper side is deep fulvous brown, the longitudinal rays and a number of transverse bands being black, but there is no row of black dots parallel with the hind margin of the hind wing. The underside has the central part of the fore wings bright fulvous; the costal margin, the hind margin, and the tip yellow; the whole beautifully adorned with black markings, more particularly a double series of black arches along the hind margin; the hind wings are beautifully tesselated with bright fulvous and yellow of two shades, arranged in bands, and divided into variously-shaped spots, every spot being surrounded by a distinct black line; first, there is a double and very slender scalloped marginal black line, then a row of yellow crescents, then another single scalloped black line, then a row of half-moon-shaped yellow spots, then a third scalloped black line bordering the yellow spots, then a row of red-brown crescents, often having the yellow and brown colours mixed and confused, but bordered with a fourth scalloped black line; then follows a band of eight large yellow-white black-bordered spots across the middle of the wing; above this is a very irregular band; and at the base of the wing are five large, yellow-white, black-bordered spots of very irregular form, and mixed with other dark brown markings equally irregular.

Life History.—The eggs are laid in July on the narrow-leaved plantain (*Plantago lanceolata*), the broad-leaved plantain (*Plantago major*), the wood sage or wood germander

(*Teucrium scorodonia*), and the germander speedwell (*Veronica chamædrys*); and the CATERPILLARS, emerging in about fourteen days, feed on these herbs for a few days, or, if the weather is congenial, a few weeks, and then hybernate at the roots of these plants: at the end of April they reascend the plants, feeding more copiously than in the autumn, and crawling up any elevated object, they may be found resting in the full blaze of the meridian sun, which they appear particularly to enjoy. I kept my specimens on a plant of the narrow-leaved plantain, and covered with a bell-glass; in the middle of the day I always found they crawled up the flowering-stems of the plantain, and I was particularly struck with the resemblance of the caterpillars to the flowers of this plant, a resemblance which perhaps serves as a protection against the birds, which at this period of the year are constantly on the look-out for caterpillars wherewith to feed their young. The head of the full-grown caterpillar is semiporreet and fully as wide as the second segment; it is scabrous and bristly; the second segment is dorsally scabrous and bristly, and having two conical spines on each side, the spines being armed with bristles; the third and fourth segments have each eight conical spines, two small and slender ones on each side close to the leg, and the others stouter and nearer the back; the following segments, from the fifth to the eleventh, both inclusive, have each nine conical spines, one of them being medio-dorsal; the twelfth has two medio-dorsal spines placed longitudinally, and three others on each side; the thirteenth has four spines, forming an irregular quadrangle, and all pointing backwards: all of these conical spines are closely beset with short stiff bristles. The colour of the head is black, the scabrous points being white: the dorsal surface of the body is velvety black, sprinkled with snow-white dots; the spines in the medio-dorsal series are pale orange at the base and white at the tip; those of the next series on each side are deeper orange at the base and white at the tip; all the others are pure white, but the bristles of the spines are black: the legs are pitchy black: the belly and claspers are smoke-coloured, indistinctly tinged with pink. My specimens changed on the 22nd May to very short and obese CHRYSALIDS, the head being transversely produced in front and broadly truncate, the base of each wing-case is also slightly produced; the body is very convex, its anal extremity bent under towards the extremity of the wing-cases, and the dorsal outline being almost semi-circular, the anal extremity attached by minute hooks to a slight web spun by the caterpillar on the edge of the plantain-leaf; the colour is creamy white, variegated with black and orange; the cases of the legs are adorned with black markings only; the back of the thorax has two conspicuous black markings, margined with orange; the eight abdominal segments have each a basal dorsal band, alternately orange and black, and very ornamental; the last segment is orange. I am indebted to Mr. Bignell for a most liberal supply of these caterpillars.—*Newman.*

TIME OF APPEARANCE.—The caterpillar lives through the winter. The chrysalis is to be found at the end of May and first fortnight in June. The chrysalis state lasts about twenty days.

LOCALITIES.—This species is extremely local, but abundant where found: it frequents open places in woods, particularly where the herbage is stunted and where heath occurs. Mr. Tress Beale observes that it is fond of basking on thistles, and that when taken it feigns death, falling into the collector's net in an apparently inanimate state, closing its wings and contracting its legs. Mr. Birchall found this species abundant at Killarney, in Ireland, but I am not aware of its having been detected in Scotland. The following are the only English localities with which I am acquainted:—

Buckinghamshire. Near Halton—*Joseph Greene.*

Cornwall. St. Martin's Wood, near Looe, sometimes very abundant—*Stephen Clogg.*

Devonshire. At Fordlands, an estate about three miles from Exeter—*E. Parfitt;* near Exeter—*J. Hellins;* abundant near Plymouth

—*Geo. Bignell.* Common, but local, frequenting heathy spots in woods; irregular in appearing; occurs some seasons, though rarely, at the end of May, at others beginning of July. In 1855 the writer bred 120 specimens from caterpillars found feeding on *Plantago lanceolatum* and *Teucrium scorodonia*. The first passed into the chrysalis condition on June 5th, and the butterfly came forth on June 28th, making the chrysalis state to occupy three weeks. A good time to capture this species is from the middle to the end of June. Dartmoor Tramway, Leighmoor, north and west, above and below Plymbridge, Shaughbridge, Ivybridge, Kingsbridge, Totnes, Tavistock, Exeter, Torquay—*J. J. Reading.*

Essex. Colchester—*Edward Doubleday;* now restricted to one wood—*W. H. Harwood.*

Gloucestershire. Guiting—*Joseph Greene.*

Kent. Blean Woods, near Canterbury, abundant—*W. O. Hammond.*

Staffordshire. Burnt Wood—*J. B. Hodgkinson;* abundant in one locality in South Staffordshire—*J. Hardy.*

Suffolk. Brandeston and Playford—*Joseph Greene.*

Sussex. Very abundant in Abbot's Wood, near Hailsham—*E. Jenner.* I have found Athalia so abundant in Abbot's Wood, that I have had ten in the net at one time. The earliest date is the end of May. They are very fond of resting on low herbage and rushes. There is one spot in the wood where they are unusually numerous — *C. V. C. Lovett.*

Wiltshire. Near Great Bedwyn, Rev. J. W. Lukis—*T. A. Preston.*

Family 3.—Angle-Wings (in science *Vanessidæ*).

The caterpillars are spiny, and of uniform thickness throughout; they are often gregarious, feeding in large companies, and generally on plants of the natural order *Urticaceæ* as formerly constituted. I am aware that some of these plants, as the elmworts, now form a separate order, under the name of *Ulmaceæ*, and others, as the hempworts, another separate order, under the name of *Cannabinaceæ*, to which the hop belongs; but our insects disregard these technical alterations, and retain their partiality for this tribe of plants whatever name they may assume in our systems: some of the species are, however, less restricted in their tastes, and eat a variety of plants. The chrysalids are always angulated, the head always eared, the points sharp and salient; they are always suspended by the tail. The perfect insect has but four perfect legs, the anterior pair wanting the claws and being unfitted for walking: the wings are angled, in some species remarkably so. We have three genera inhabiting Britain—*Grapta*, *Vanessa*, and *Pyrameis*.

11. The Comma (*Grapta C-album*).

11. The Comma.—The hind margin of all the wings is angled and deeply indented, more remarkably so than in any other English butterfly: the colour of the upper side is sienna-brown with a broad band of redder brown along the hind margin of all the wings: the fore wings have seven darker brown spots, the three largest on the costal margin, and the two smallest on the very centre of the wing: the hind wings have three brown spots near the base, and a band of red-brown spots parallel with the marginal band. The underside is clouded brown, and in the very centre of each hind wing is a pure white and very distinct mark, which some say resembles a comma, others compare it to the letter C; it is somewhat like both of these, and hence the names of White C butterfly, and Comma butterfly.

Obs.—There are three very constant varieties observable in the colouring of the underside of the species, the characteristics of which may be described as repletion, variety, and depletion: in the first the brown is dark, dull, and uniform; in the second it is richly varied with different shades of brown and metallic green; and in the third the colour seems partially bleached, and assumes a tinge of fulvous yellow. Mr. Dale, one of our best lepidopterists, regards the first and third of these varieties as a first and second brood. It would be an interesting and noteworthy fact if it could be shown that the generations

11. Comma Butterfly. Upper side.

Under side.

alternate in this manner; but it would be no anomaly should this prove to be the case.

Mrs. Hutchinson, of Leominster, who is perhaps better acquainted with this butterfly than any other entomologist in the kingdom, considers the uniformly dark-brown specimens to be females, and the richly varied specimens to be males. Accepting these views as correct, there still remains a little difficulty in the extreme uniformity of colouring in all the fulvous or vernal specimens: these are certainly not all of one sex.

Life History.—The egg is laid in May by hybernated females on the hop (*Humulus lupulus*) and red-currant (*Ribes rubrum*), both in a state of cultivation, and on the elm in the semi-domestic position of a hedge row. The caterpillar, when full grown, is obese in its form and slow in its movements. The head is slightly porrected, scabrous, and furnished with two conspicuous compound spine-like horns, one of which originates in the upper middle of each lateral plate of the head; these horns are quinquefid at the extremity, one division pointing directly forwards, the others ranged round the base of the first and pointing in four different directions; the ocelli are crowded together at the mouth, and each stands at the extremity of a short pedicel. The body is very stout; the second segment is no wider than the head; the third and following segments are twice that width, and very robust, and the interstices between them are very deep and clearly defined; the second segment is without prominent spines, but has several minute bristle-bearing warts; it is black, with pale red-brown lines; these are somewhat transversely disposed on the back, but longitudinally on the sides; there are seven rows of strong branched spines on the body; four of these rows begin on the third segment, the other three, namely, the medio-dorsal and the lowest on each side, begin on the fifth: the medio-dorsal series consists of eight spines, and each medio-dorsal spine is slightly in advance of that next to it on each side; the other series consist of eleven spines each; the twelfth and thirteenth segments have each but two spines. The colour of the face is velvety black, but adorned with many paler markings, two of which, originating on the crown, pass obliquely down the face to each side the clypeus: the general colour of the body is gray, interspersed with red-brown; there is a broad medio-dorsal stripe of pure white, commencing on the seventh and ending on the twelfth segment in an obtuse point; the last segment has also a large white spot on each side: the spiracles are exactly intermediate in situation between the second and third lateral series of the spines, they are black and surrounded with white, and the white again with black, and finally the black with red-brown: the space below the spiracles is delicately reticulated with gray; the spines which emanate from the white stripe are also white; those of the third or lowest lateral series, also those of each series as far as the sixth segment inclusive, are pale brown; those of the other lateral series from the seventh to the extremity are white at the tips and pale brown at the base: the ventral

surface is black, irrorated and reticulated with gray and red-brown: the legs are black and red-brown: the claspers red and gray. When full-fed it spins a little hillock of white silk on one of the ribs or on the petiole of the hop-leaf, or on the stem of the hop-plant, or on the hop-pole, or on the leaf-stalk of the currant; and, attaching itself thereto by its posterior claspers, it hangs head downwards, and is transformed to an angulated CHRYSALIS; the head is deeply notched, and the two horns or ears, containing the palpi, are distant, pointed, and curved towards each other at the tips; the back of the thorax has a central elevation laterally compressed and very thin; the sides of the thorax have two blunt protuberances; there is a deep dorsal excavation between the thorax and abdomen; the back has three series of raised points, and on each side are two such series; the points on the medio-dorsal series are small and inconspicuous, those of the next series on each side are large and prominent; the first of the lateral series is above, the second below, the spiracles; both are inconspicuous; the sides of the body, at its junction with the thorax, are much bulged, making this the broadest part of the chrysalis; the anal segment is long and slender, and terminates in a cluster of minute hooks, by which it is suspended from the web; the colour is umber-brown, delicately reticulated with black lines; on the back, in the depression between the thorax and body, are three or more blotches of beautifully burnished silver.—*Newman.*

TIME OF APPEARANCE.—The CATERPILLAR is found on the hop and red currant in July and August, and the chrysalis in September; the butterfly occurs most abundantly in September and October; it feeds on the fruit of the bramble and on plums, and is very fond of settling on the blossoms of the thistle; but although this season is the most prolific one for this butterfly, I have repeatedly seen it in the spring, after hybernation, and also in June, July, and August. An idea seems prevalent that there are two broods in the year, the first emerging from the chrysalis in June and July, the second in August and September. I think this is a mistake; I have been able to obtain no satisfactory evidence of any caterpillars prior to those so abundant in the autumn months about the season of hop-picking.

LOCALITIES.—A species of very capricious habits in regard to geographical range in this country, in some localities being a constant resident, in others appearing and disappearing at intervals. Mr. Birchall has recorded its occurrence at Powerscourt in Ireland, but I have no knowledge of a Scotch specimen. In England and Wales it may be called local rather than rare. A noticeable feature in its distribution is its absence from what may be called maritime lists, as those from Norfolk, Suffolk, Kent, Sussex, Isle of Wight, Dorsetshire, Devonshire, and Cornwall: this absence from the lists is not sufficient evidence of the butterfly's not occurring there, but certainly of its great rarity, or it could not have escaped the notice of entomologists: in the midland counties, on the contrary, it is of frequent occurrence, and in some of them absolutely abundant; then, again, the cultivation of its food-plant, the hop, does not seem to exercise that influence on its choice of localities that might be expected; it abounds in the district where the Worcester hops are grown—namely, Worcestershire and Herefordshire, but it is rarely observed in the Farnham district—namely Surrey—or in the Kent district.

The subjoined list of counties will exemplify this:—

Buckinghamshire. Drayton Beauchamp—*H. H. Crewe.*

Cambridgeshire. One specimen at Ely, many years ago—*Marshall Fisher.*

Cheshire. Occasionally in gardens—*E. Birchall.*

Cumberland. Barron Wood: the caterpillar and chrysalis are sometimes found on the large scabious in abundance—*J. B. Hodgkinson.* [Is not this a mistake?—*E. N.*]

Derbyshire. Breadsall—*H. H. Crewe;* Calke Abbey—*H. A. Stowell.*

(Dorsetshire. Formerly in plenty at Glanville's Wootton, but none have been met with for fifty-four years. The first brood have the

underside yellowish, the second brood dark—*J. C. Dale*).

(Durham. Formerly at Gibside—*John Hancock;* formerly at Castle Eden Dene and Shull—*William Backhouse;* formerly at Darlington, but now almost, if not quite, extinct—*J. Sang.*)

Essex. (Many years since it used to occur in profusion at Epping; I cannot give any date, but it was when I was a mere child—I should judge about 1817 or 1818. Two or three of the specimens taken then were in existence not many years back—*Edward Doubleday*); two or three have been taken at Colchester, but it is a great rarity—*W. H. Harwood;* Saffron Walden—*W. R. Jeffrey.*

Glamorganshire. Scarce at Llantrissant—*Evan John;* occurs regularly, but sparingly, at Ynisygerwn—*J. D. T. Llewelyn.*

Gloucestershire. Several places near Gloucester—*Joseph Merrin;* gardens at Pitchcombe near Painswick, and about Strond—*M. G. Musgrave;* Guiting—*Joseph Greene;* Coombe Glen, near Bristol—*F. D. Wheeler;* Leigh Woods and Stapleton—*Alfred E. Hudd.*

Hampshire. Farlington—*W. Buckler;* occasionally seen, but far from common—*G. B. Corbin.*

Herefordshire. Oakley Park—*F. E. Harman;* Amestrey, Monkland, Westhope, Brierly, Dinmore, Boddenham, and all round Leominster—*E. Newman;* very common in hopyards some years, in others scarce—*Mrs. Hutchinson;* near Bromyard—*W. H. Draper.*

Huntingdonshire. Near Peterborough—*F. Bond;* Monkswood on the 5th and 6th of July, 1832—*James Francis Stephens.*

(Kent. From many sources I learn that this butterfly was said to be common in the Maidstone hop district half a century ago, but I have no more precise or reliable information—*E. Newman*).

Lancashire. In gardens occasionally—*Edwin Birchall;* Grange—*J. B. Hodgkinson.*

Lincolnshire—*T. H. Allis.*

Middlesex. One taken near Edgware—*F. Bond.*

Monmouthshire. Rather scarce in Huellis' and St. Julian's Woods—*George Lock.*

Northamptonshire. Common near Wadenham—*F. Bond;* near Towcester—*Hamlet Clark.*

Northumberland. I saw a specimen in 1868 which had been taken near Newcastle—*W. Maling.*

Nottinghamshire. It used to be taken near Mansfield, and also at Ollerton and Warsop, but not of late years—*R. E. Brameld;* Newark and the neighbourhood—*George Gascoyne.*

Oxfordshire. Bagley Wood—*W. H. Draper.*

Radnorshire. Frequent about New Radnor, Hindwell, Llandegley, Pen-y-bont, and Llandrindod, settling on the common thistles of the wayside.—*E. Newman.*

Shropshire. Coalbrookdale and Wenlock—*C. G. Barrett.*

Somersetshire. Clevedon—*A. E. Hudd.*

Staffordshire. Swinnerton Old Park—*T. W. Daltry;* Repton Scrubs and Seal Wood, near Burton-on-Trent—*Edwin Brown.* In some years it is far from uncommon at Wolverhampton; ten specimens were taken here in 1867, five of them feeding on ripe damsons—*F. E. Morris.*

Warwickshire. Occasionally at Stratford-on-Avon—*W. G. Colborne;* Rugby—*A. H. Wratislaw.*

(Wight, Isle of. It is reported to have occurred in former years in the island, more especially at Freshwater, but the three excellent entomologists who have heard the tradition—namely, James Pristo, Alfred Owen, and Henry Rogers possess no further knowledge of the subject).

Wiltshire. Has occurred once near Marlborough—*T. A. Preston.*

Worcestershire. It occurs occasionally in all parts of the county—*J. E. Fletcher;* formerly abundant at Great Malvern but now scarce—*W. Edwards.*

Yorkshire. Common at York—*T. H. Allis* (formerly taken at Raincliff Wood, near Scarborough, but not of late years—*J. H. Rountree*); Huddersfield, rarely and singly—*G. T. Porritt;* Halifax, Sheffield, Wakefield, Leeds—*Edwin Birchall.*

12. Small Tortoise-shell (*Vanessa Urticæ*).

12. Small Tortoise-shell.—The hind margin of all the wings is angled; the prevailing colour is bright red brown; on the costal margin are three large black spots: the colour between the body and the first black spot is red-brown; between the first and second spots, yellow; between the second and third spots, yellow; between the third spot and the marginal band, white; in the very middle of the wing are two small round spots, and on the middle of the hind margin is a large square black spot joining to a yellow spot beyond it; the hind wings have the basal half black, followed by a broad band of red-brown, shaded to yellowish towards the costal margin; all the wings have a brown variegated band round the hind margin; this consists of a scalloped black line, in the indentations of which are semicircular blue spots; outside these spots is a dingy brown space, and a distinct darker line running all the way round, dividing it into two narrow portions.

The butterfly is subject to some very beautiful and striking varieties, all of which have repeatedly occurred. The specimens figured have been kindly lent purposely for this work.

Small Tortoiseshell. Var. 1.

Var. 1.—Is quite without the two spots on the disk of the wing so conspicuous in the ordinary specimens. The specimen figured is in Mr. Owen's collection.

Obs.—This variety was taken at Hawkshead, in North Lancashire, and is alluded to at page 129 of the third volume of the "Entomologist," by Mr. C. S. Gregson, "as the variety *Ichnusa* of Bonelli; the same form being common in Sardinia;" but Mr. Muller, at page 164 of the same journal, says that this form, whether we call it a species or variety, is entirely confined to Mediterranean latitudes.

Small Tortoiseshell. Var. 2.

Var. 2.—Has a black band crossing the middle of the wing. The specimen figured is in Mr. Bond's collection.

Small Tortoiseshell. Var. 3.

Var. 3.—Is altogether abnormal, the form and colouring being entirely altered. This variety has repeatedly occurred both in England and on the Continent. The specimen figured is in Mr. Owen's collection.

Obs.—Mr. Birchall, who has so assidnously collected in the Isle of Man, observed that in that island this species was uniformly much smaller than in England. He has kindly presented me with an interesting series of these dwarfs.

Life History.—The eggs are laid in the months of May and June, on the leaves of stinging nettles (*Urtica urens* and *Urtica dioica*), in batches of sixty or eighty, and sometimes a much larger number; the females which perform this duty having survived the winter. The eggs are so much the colour of the nettle leaves that it is difficult to detect them; they are laid all in a lump, like a bunch of grapes or a handful of gooseberries, and as the late Dr. Maclean, of Colchester, justly observed, have a very singular appearance. Each egg is oblong, and depressed at both extremities; at the upper extremity is a circular operculum, which is pushed off and disappears at the time of hatching; there are generally eight longitudinal keels or ridges extending from the operculum to the base, but this number is not constant, varying to seven and nine. In an average period of fourteen days, but varying according to the temperature, the young caterpillars emerge, and remaining in company, spin together the leaves of the food-plant: as they consume the leaves the limits of their dwelling is extended, and they continue to live in company until fully half-grown; they then separate, and each feeds alone. When full-fed they rest in nearly a straight position, but on being disturbed fall off the food-plant, and lie in a curved posture, the head and tail approaching. The head is wider than the second segment, but narrower than those which follow; it is somewhat notched on the crown, and is covered with spinose points, which vary in size, and each of which terminates in a bristle; the second segment is narrow, and has a transverse series of small spines, each of which terminates in a bristle; the third and fourth segments have each a transverse series of eight spines—two on each side of the belly near the insertion of the leg, very small and inconspicuous; and two others on each side of the back, conspicuous and branched, each of the branches, as well as the central spine, terminating in a bristle; the following segments, from the fifth to the twelfth inclusive, have each seven branched spines, one medio-dorsal, the other at regular intervals, the medio-dorsal spine always placed slightly in advance of the rest: the thirteenth segment has four branched spines: the head is black, its warts white: the body has the dorsal surface black and irrorated with yellow dots, each of which emits a slender bristle; these dots are frequently so numerous as to form a broad yellow medio-dorsal stripe, which, however, is always interrupted by a narrow median black stripe: on each side are two yellowish stripes, one above, the other below, the spiracles; the subspiracular stripe is the brighter and more distinct of the two; the spiracles are black and surrounded by a pale ring; the belly is pale, excepting between each pair of claspers, where it is dark, but still irrorated with minute white dots; the spines are generally smoky green, but not unfrequently black; the claspers are smoky green. When full-fed the caterpillar frequently crawls away from its food-plant, and selects a twig or leaf of some neighbouring plant, or the coping-stone of a wall, or a wooden rail or palings, on which to undergo its change to a chrysalis, but it more often prefers the under side of a nettle-leaf; in either case it spins a slight web over the object selected, and, suspending itself therefrom by the anal claspers head downwards, it becomes a rather elongate and sharply angulated chrysalis, which has the head deeply notched on the crown, the points distant and acute; the thorax is dorsally humped, the hump having a median elevated point; on each side of the thorax, near the insertion of the wing-cases, are two rather obtuse elevations; the back has three series of raised points, the median series consisting of six, all of them small and insignificant; each lateral series consists of nine points, three of them thoracic, small and insignificant, the remaining six conspicuous and abdominal; the terminal segment of the body is slightly spoon-shaped, and terminates in a complete fringe of minute hooks, by which the chrysalis is attached to the web: the prevailing colour of the chrysalis is brown, mottled or reticulated with black, and adorned with golden spots and reflexions; the spots generally comprise the lateral spinous processes; about the junc-

tion of thorax and body the reflexious or tints of gold are more extended, sometimes embracing the wing-cases.—*Newman.*

Time of Appearance.—I have found the caterpillars abuudantly on nettles in May and July, and I have succeeded iu rearing butterflies from both these broods; the chrysalids are found at the end of May aud begiuuing of June, and the butterflies in almost every month iu the year, begiuning, of course, with hybernated specimens. An interesting note on the commencement and termination of this insect's hybernatiou, by that most accurate observer, the Rev. O. Pickard-Cambridge, is published at p. 299 of the third volume of the "Entomologist." Mr. Pickard-Cambridge says:—"Ou one of the first Suudays in August last, during diviue service, a specimeu of *Vanessa Urticæ* flew into the parish church of Winterbourne-Tomson, in which I was officiating. After fluttering iu the wiudows and flying about the church for a short time, the insect settled upou a projecting rafter iu a conspicuous place, and remained, with its wings in the usual state of repose, during the remaiuder of the service. Ou the Sunday following it was still *in statu quo;* and so, Sunday after Sunday throughout the autumn and winter, evidently never haviug once moved from its first position. There it was until, ou Sunday, the 5th of May, it came off its perch, and was flying briskly about the church when I came away after the conclusion of the service. Its period of motionless repose had thus been just nine months, and it was apparently as fresh in colour aud condition as if just out of the chrysalis." Professor Westwood has expressed his surprise that a specimen captured iu the spring proved on examination to be a male. I may inform him that both sexes iuvariably hybernate iu the perfect state and reappear in early spring. From the time of the first vernal appearance of these hybernated specimens there is usually a succession of individuals, liable to an occasioual interruption about Midsummer. Mr. Tuely records ("Entomologist," ii., 294) that he took a recently hatched specimen on the 6th June, and Mr. Doubleday informs us ("Entomologist," ii., 294) "that in 1865 huudreds of caterpillars were hatched on nettles in a field adjoining his garden towards the end of April; these were full-grown in May, and the butterflies were on the wing in the middle of June: there was not a single caterpillar ou the nettles from the third week in May until the first week in July, when swarms of young ones again appeared; these were full-fed early in August, and the butterflies were again on the wing early in September." Thus there are evidently two broods in the year, and June and September may be given as the dates for their appearance. Some of the second brood remain uutil October in the chrysalis state, and Mr. Clogg has observed the emergence of specimens on the 23rd and 25th of December. The Small Tortoiseshell seems attached to the residences of mau, and, like many auimals, has its economy modified in accordauce with this association.

Obs.—The caterpillars of *Vanessa Urticæ*, aud, as I surmise, of the genus *Vanessa* in general, are remarkably exempt from the attacks of ichneumons. Thus I collected last July about forty nearly full-growu caterpillars of this species, and every oue of them became a chrysalis and emerged in due time. I observe also in rearing this butterfly, that if from insufficient or inappropriate food the caterpillars have not attained their full size when they enter the chrysalis state, the perfect insects make their appearance with perfect wings, but of a diminutive stature; iu this respect differiug from moths, which, under similar circumstances, appear with shrivelled and imperfect wings.—*J. R. S. Clifford*, iu "Entomologist," vol ii., p. 132.

Localities.—Distributed with considerable equality over every part of the British Islands. Mr. Birchall simply records that it is "commou" in Irelaud. Dr. Buchanan White says, "It is as abundant in Perthshire as it is elsewhere, aud is fouud from the sea level up to the summit of Beu Lawers. It is one of the few butterflies uoticed by outsiders, who call it the Emperor Butterfly, the Devil Butterfly, or Witch Butterfly. Scottish examples are larger than English ones."

13. Large Tortoiseshell (*Vanessa Polychloros*).

13. Large Tortoiseshell. — The costal margin of the fore wings is very slightly rounded in the middle, and rather suddenly bent towards the body at the base; the hind margin of all the wings is scalloped and angled, some of the angles being more prominent than the rest, as shown in the figure. The prevailing colour is dull fulvous brown; the fore wings have three large squarish black spots on the costal margin; the spaces between them being lighter than the rest of the wing; there are two small round spots near the middle of the wing, and two larger round spots below these, and at equal distances from the hind margin: the hind wings have a large black spot on the costal margin, and a paler space nearer the marginal band: this marginal band goes round the hind margin of all the wings; it is composed, first, of a black line, which, in the fore wings, is plain, but in the hind wings contains a row of semicircular blue spots; and, secondly, of a dingy brown marginal space, through the middle of which runs a narrow dark-brown line.

Obs.—The pattern of this species is extremely like that of the preceding, but the colours are duller, and it may generally be distinguished by its larger size: there are also two constant differences in the markings; in *Urticæ* the space between the second and third black costal spot is white, while in *Polychloros* it is dull yellow; in *Polychloros* there is a black spot in the anal angle of the fore wing which is absent in *Urticæ*. It is little subject to variation.

Life History.—In the Spring of the year both sexes of this butterfly may be seen toying with each other in our lanes, and occasionally, but less commonly, on the outskirts of woods: impregnation takes place at this season, generally in the month of May, but sometimes as early as April. The ovary of the female is now distended, and the eggs are prepared to receive the fecundating element; in these and other insects the eggs attain their full size and character prior to fecundation. In the autumn, on the contrary, in the very few females I have been able to obtain, there is no distinct appearance of eggs in the ovary; and neither males nor females exhibit indications of the sexual impulse. The Eggs are laid in May, on the leaves of various trees. The wild and cultivated cherry (*Prunus cerasus*, the Cerisier and Griothier of the French) seems the tree chiefly selected in France, and whole rows of these trees may occasionally be seen in July entirely stripped of their leaves by the caterpillars of this species. In England the trees selected are the aspen (*Populus tremula*), white beam tree, whip crop, or white rice (*Pyrus aria*), sallow (*Salix caprea*), osiers (*Salix viminalis* and *S. vitellina*), and more commonly the different species or varieties of elm (*Ulmus*): in gardens it is also found on cherry and pear trees. The eggs are very numerous, some-

times as many as four hundred in number; they are crowded together on small twigs or branches of the elm, sometimes completely surrounding the twig and forming what, in the instance of the Lackey Moth, has been called a necklace; the eggs, however, although closely approximate, are not embedded in glue, as is the case in the Lackey Moth, but each egg seems quite unconnected with the rest, although touching it; each has a distinct operculum, which is forced out of its place and is probably eaten by the young caterpillar on its natal day, and also eight longitudinal ridges or keels, which commence near the crown or operculum and terminate at the base, just where the egg adheres to the twig: the number of these ridges is not perfectly constant to eight, as in a few instances I have found only seven, and also in a few instances as many as nine. I am greatly indebted to Mr. Pristo for a specimen beautifully illustrating this curious chapter in the life history of the species. The CATERPILLARS are hatched in a fortnight, and are full grown about Midsummer; at this period they rest in a straight position on the food plant, and are readily shaken off, and fall to the ground; they have rather a limp and flaccid character, and exhibit scarcely any disposition to assume the ring form. Being laid and hatched in such large companies the caterpillars remain in close proximity during life, single specimens being very rarely met with. The head is exserted, being manifestly wider than the second segment; its position is prone, its crown slightly notched, and the divisions slightly elevated; the entire surface of the head is scabrous, this character arising from the presence of numerous small warts and elongated papillæ, the length of which is about equal to three times their breadth; the warts and papillæ are intermixed, but the latter predominate on the crown, the former on the cheeks; from the summit of each wart or papilla emerges a slender and slightly bent hair; the body is almost uniformly cylindrical, and is armed with sharp spines on every segment except the second; these spines constitute seven longitudinal series, the first of which is medio-dorsal, and consists of eight spines, namely, one on each segment from the fifth to the twelfth, both inclusive; each spine in this medio-dorsal series, at about half its length, emits a single branch, which is directed forwards in a slanting direction; the first lateral series consists of ten spines: these commence with the third, and end with the twelfth segment; each spine in this series has at least three lateral branches, all of which spring from a point nearly equidistant between the base and tip of the main spine; the second lateral series is composed of rather smaller spines, and each of these is branched much in the same way as those of the preceding series; and again still below this is a third lateral series of eight smaller spines, which begin on the fifth and end on the twelfth segment; these are also branched like those already described; each spine in the second lateral series stands a little in advance of the corresponding spine in the first lateral series, and rather more so in advance of that in the third; the thirteenth segment has four branched spines, forming a quadrangle, and all of these lean slightly backwards; the ventral surface is without spines, and is deeply wrinkled at the interstices of the segments, but not between each pair of legs or claspers; above each leg, or clasper, are a number of longish deflected hairs, and these form a lateral fringe, not particularly distinct. The head is black, its shorter hairs being also black, but the longer ones white; the surface of the body is thickly sprinkled with minute warts, each emitting a hair from the summit; these are gathered into dense groups down the middle of the back, and are there of a pale brown colour, forming a continuous but irregular stripe, which expands to the base of each spine in the first lateral series; this pale stripe is interrupted throughout by a narrow medio-dorsal stripe of velvety blackness; the pale warts also form groups round the base of each spine in the second lateral series, and again a narrow stripe in the region of the spiracles, which are scarcely perceptible; this lateral stripe includes in its course the third or lowest lateral series of spines; on the other parts of the body these minute warts are almost white,

giving the surface a gray appearance; they form transverse series on the sections of the segments; the spines are ochreous as well as their branches excepting the extreme tips, which are black: the yellowish spines give the caterpillar the appearance of having much more decided yellow stripes than is the case; the legs are black; the claspers pale dingy brown. It changes to a CHRYSALIS suspended by the tail very soon after attaining its full size, and is often found under the coping-stones of walls, on the trunks of trees, and on park palings. The chrysalis has a divided or eared head, the two points being widely separated and acute; the thorax has a short, elevated dorsal keel, and two spines on each side; the body has two series of dorsal spines, each series consisting of six spines. I am indebted to Mr. V. Lewes for full-grown specimens of the caterpillar, sent expressly for this work.—*Newman.*

TIME OF APPEARANCE.—The caterpillar is found in June, about the middle or latter end of which month it assumes the chrysalis state, and the butterflies appear about the middle of July, and remain on the wing about a month, when they retire for the winter.

LOCALITIES.—This butterfly seems to be absent from Scotland and Ireland, but to be generally, although sparingly, diffused throughout the midland and eastern counties of England; I am aware that Mr. Birchall mentions a specimen said to have been seen near Galway in 1861, but it was not taken, and he evidently discredits the *on dit*. In England its rarity in the north and extreme south-west is very noticeable: from Northumberland and Westmoreland I have no record of its occurrence; from Cumberland, Durham, and Lancashire, one from each county; six Yorkshire localities are reported; from Derbyshire, Nottinghamshire, Staffordshire, Northamptonshire, and Norfolk, it is reported as rare; and in Herefordshire as "not common;" in Cambridgeshire, Huntingdonshire, Warwickshire, Worcestershire, Suffolk, Essex, Hertfordshire, Bedfordshire, Middlesex, Buckinghamshire, it is "not uncommon;" in Kent, Surrey, Sussex, Hampshire, and Dorsetshire it is "common": in Devonshire a dozen localities are mentioned where single specimens have been taken. It is rather a feature in the history of this insect that it occurs singly: in the very numerous records I have received more than half speak of single specimens.

Berkshire. Burghfield, near Reading—*C. S. Bird.*

Buckinghamshire. Drayton-Beauchamp—*H. H. Crewe.*

Cambridgeshire. Generally.

Cheshire. Eastham—*E. Birchall.*

Cornwall. Near the gasworks at Looe, but very rare; I recollect them much more plentiful—*Stephen Clogg;* Whitsand Cliffs—*J. J. Reading.*

Cumberland. A single specimen taken on the bank of the Solway—*J. B. Hodgkinson.*

Derbyshire. Breadsall—*H. H. Crewe;* Calke Abbey—*H. A. Stowell.*

Devonshire. Scarce near Plymouth—*J. J. Reading,* who mentions a great number of localities within the county where single specimens have been taken; I have seen a single specimen every spring for the last five years on the road from Plymouth station to Plymbridge—*G. C. Bignall.*

Dorsetshire. Glanville's Wootton, rare in the autumn, but more plentiful in the spring—*J. C. Dale.*

Durham. A single specimen at Whitburn, on the 23rd July, 1858—*John Hancock;* a single specimen at Darlington—*J. Sang.*

Essex. The caterpillars were formerly most abundant, feeding on elm at Buckhurst Hill, on the borders of Epping Forest, but I have not seen them for many years—*E. Newman;* very common round Colchester in 1860, the caterpillars feeding on elm, sallow, and osier, now rare—*W. H. Harwood;* Chingford—*W. J. Argent.*

Glamorganshire. Scarce—*Evan John.*

Gloucestershire. Scarce—*J. Merrin;* once near Stroud—*M. G. Musgrave;* a great number of localities in this county have reached me through the kindness of correspondents.

Hampshire. Some years not uncommon in the spring after hybernation—*G. B. Corbin.*

Many Hampshire localities are mentioned by my correspondents.

Herefordshire. Occurred at Leominster in 1858 and 1859—*Mrs. Hutchinson;* Oakley Park, near Hereford—*F. E. Harman.*

Hertfordshire. Many localities—*F. Bond.*

Huntingdonshire. Many localities—*F. Bond.*

Kent. The caterpillars were plentiful on elms by the Fox and Hounds at Darent Wood, in 1830, and the butterflies of very frequent occurrence in Burnt Ash lane, Lewisham, in the spring of 1856, after hybernation—*E. Newman;* the caterpillars were plentiful on an elm tree in Tonbridge school ground in 1869—*C. L. Raynor;* abundant at Faversham, Boughton, and other places, the caterpillars feeding on the white beam (*Pyrus arria*), elm (*Ulmus*), and goat willow (*Salix caprea*) —*H. A. Stowell.*

Lancashire. I have seen one specimen taken at Red Scar, near Preston—*J. B. Hodgkinson.*

Lincolnshire. Common—*T. H. Allis.*

Middlesex. In many localities—*F. Bond.*

Norfolk. Norwich—*C. G. Barrett.*

Northamptonshire. Barnewell Wold—*F. Bond;* near Towcester—*Hamlet Clark.*

Nottinghamshire. Was formerly taken at Mansfield, Ollerton, and Worsop, but not met with of late years—*R. E. Brameld;* at Newark, but not common—*George Gascoyne.*

Shropshire. Wenlock—*C. G. Barrett.*

Somersetshire. Clevedon—*A. E. Hudd.*

Staffordshire. Scarce at Burton-on-Trent —*E. Brown;* one at Wolverhampton—*F. E. Morris.*

Suffolk. Generally distributed.

Surrey. In all parts of Surrey—*S. T. Klein.*

Sussex. I once found the caterpillars in abundance feeding on aspen (*Populus tremula*); they were nearly full-fed, and I succeeded in rearing more than a hundred of the perfect insect—*C. V. C. Levett.*

Warwickshire. Not uncommon; some specimens were taken at Stratford-on-Avon, attracted by the sweets of empty sugar casks in a grocer's yard—*W. G. Colborne;* Rugby —*A. H. Wratislaw.*

Wight, Isle of. Moderately common in woods—*James Pristo;* a dozen different localities are mentioned by different correspondents.

Wiltshire. At Marlborough, but very uncommon—*T. A. Preston.*

Worcestershire. Taken on three occasions at Worcester—*J. E. Fletcher;* one specimen at Malvern—*W. Edwards.*

Yorkshire. Near Scarborough, Huddersfield, York, Sheffield, Wakefield, and Halifax —*Edwin Birchall and others.*

14. The White-bordered, called also the Camberwell Beauty (*Vanessa Antiopa*).

14. The White-bordered.—The hind margin of all the wings is angled; the colour a rich puce brown; all the wings have a broad band of dingy white on the hind margin, and

a row of blue spots just within this band; the fore wings have two whitish spots on the costal margin rather beyond the middle.

Life History.—The eggs are laid in the spring, after the female has hybernated, on the nettle (*Urtica dioica*), the birch (*Betula alba*), and far more commonly on the white willow (*Salix alba*). The caterpillars are covered with long branched spines: the head is black; the body also black, with a mediodorsal blotch on each segment from the fifth to the eleventh both inclusive, of a brick-dust red colour. The chrysalids are angulated, eared, and suspended by the tail.—*Hubner's and other figures.*

Obs.—I have no knowledge of the earlier states of this butterfly except from books; it is a most abundant continental species.

Time of Appearance.—Early spring and late autumn. I believe that hybernated specimens are much more common than is generally supposed. The caterpillar and chrysalis states must of necessity occur between the spring and autumn flights, but I have no practical knowledge of this.

Localities.—I have very great difficulty in defining localities for this insect: on the continents of Europe and North America it is abundant, but its appearance in the British islands is in the highest degree uncertain, and apparently capricious.

"There is something very extraordinary in the periodical, but irregular, appearances of this species. . . . . It is plentiful some years, after which it will not be seen by anyone for eight, or ten, or more years, and then appear again as plentiful as before. To suppose they come from the Continent is an idle conjecture; because the English specimens are easily distinguished from all others by the superior whiteness of their borders. Perhaps their eggs in this climate, like the seeds of some vegetables, may occasionally lie dormant for several seasons, and not hatch until some extraordinary but undiscovered coincidences awake them into active life." This sentence has often been quoted with apparent approbation, but I feel considerable difficulty in accepting the solution, because the eggs of the Vanessidæ pass so few days in that state, and would, of necessity, fall with the falling leaves of the willow, and the young caterpillar on emergence would be irretrievably separated from its food-plant.

From Ireland I have a report of one taken at Killarney in July, 1865, by W. G. Battersby. In Scotland also one was taken by the late Charles Turner, in the Ramoch district. I saw this specimen, and have no doubt of its genuineness. Indeed, Turner combined with many eccentricities, and I may say errors, a love of truthfulness in entomological matters that I could always depend on. Mr. Thomas Chapman has information of others at Paisley and Edinburgh. In England its appearances are numerous, almost every county boasting its single individual. Formerly this was not the case. From the way in which Moses Harris writes of this butterfly in England, we are led to suppose that in his time it was regarded as no great rarity. In his "Aurelian" he merely says that it goes through its changes and appears on the wing at the same time as the Peacock. Lewin is more explicit:—

"Three of these beautiful and rare insects were taken in the year 1748, near Camberwell, in Surrey, from which time until the year 1789 we have no account of any being seen in England. The middle of August, 1789, I was surprised with the sight of two of these elegant flies near Feversham, in Kent, one of which I thought it great good fortune to take; but in the course of the week I was more agreeably surprised with seeing and taking numbers of them in the most perfect condition. One of my sons found an old decoy pond of large extent, surrounded with willow and sallow trees, and a great number of these butterflies flying about and at rest on the trees; many of them appearing to be just out of the chrysalis, left no room to doubt that this was the place where they bred. In March, 1790, a number of these insects were flying and soaring about for the space of twelve or fourteen days; and then, as if with one consent, they migrated from us, and were no more seen."

And, again, Mr. Wailes, in his "Catalogue of the Lepidoptera of Northumberland and Durham," has this interesting observation:—"Our fellow member, Mr. William Backhouse, informed me that about the year 1820 he saw vast numbers of this species strewing the sea-shore at Seaton-Carew, both in a dead and living state. Now," continues Mr. Wailes, "it is surely more reasonable to suppose that these specimens had been blown from the land than that they had crossed a sea at least three hundred miles; and a specimen in Mr. Backhouse's collection confirms this opinion, as it has the pale whitish margin to the upper side of the wings so characteristic of our British specimens, which is replaced by yellow in nearly all the continental and American specimens." Mr. Stephens adds, on the authority of the same excellent entomologist, "Mr. Backhouse informs me that it has been found repeatedly near Seaton, Durham, and often floating on the river Tees." These quotations prove, as I consider, incontestibly that in former years this butterfly has been abundant some years both in the north and south of England.

15. Peacock (*Vanessa Io*).

15. Peacock.—The hind margins of all the wings are angled; the fore wings with the lower half of that deep red-brown colour which is called dragon's blood; the costal margin at the base is black, delicately barred with yellow; beneath this are two black blotches, and between them a yellowish spot; beyond the second and largest black blotch is a large and beautiful eye-like mark, composed of a variety of colours, and below this eye are two small blue-white spots: the hind margin is broadly bordered with smoky-brown: the hind wings are smoky-brown towards the costal and hind margins, red-brown towards the inner margin, and having a beautiful eye-like mark towards the apical angle. The underside is jet black.

Life History.—The eggs are laid in April and May, on the common stinging nettle (*Urtica dioica*), and the young caterpillars emerging in about ten or fifteen days, according to the temperature, feed, and to the best of my knowledge exclusively, on the leaves of that familiar but unpopular plant: they generally attain their full growth during the first week in July, but sometimes arrive at maturity a week earlier, and also not uncommonly a week or a fortnight later: when full-fed the caterpillar rests in any position it may have accidentally assumed while feeding or seeking food; it has rather a limp and flaccid habit, and falls to the ground helplessly on the nettle's being shaken, but almost immediately re-ascends and recommences feeding: it seems difficult to imagine how it can escape the sharp spines of the nettle, or what antidote it possesses against the injury, supposing it to receive one; certain it is that the creature traverses most fearlessly both the stem and leaves of the nettle, and appears to remain unscathed among the phalanx of poison-laden spears with which it is threatened on all sides: have the spines any protective function? The

head is wider and larger than the second segment, shining, but beset with nipple-shaped warts, each of which emits a bristle from the summit; the body is almost uniformly cylindrical but spiny, the incisions between the segments are marked with considerable distinctness, the sections of the segments being also defined by transverse lines, each section having a series of minute warts, and each wart emitting a slender hair from its summit; with the exception of these spines and warts the surface of the body is velvety: the anterior half of the dorsal surface of the second segment is shining, but scabrous, warty, and bristly, the posterior half is velvety; this segment is without spines, but its pectoral surface has an oblong median aperture exactly between the fore legs, and somewhat resembling an enlarged spiracle, the margins of which have been produced and elevated; the third and fourth segments have each two dorsal spines placed transversely, distant and rather spreading; the fifth has four spines, two dorsal and one on each side lateral; the remaining segments, the sixth to the twelfth, both inclusive, have each six spines, two of them dorsal and two on each side lateral; and the thirteenth has four spines arranged in a trapezoid, and all of them directed backwards; in those instances in which six spines are present—three on each side—the middle one of each three is placed a little in advance of the other two; it must be borne in mind that there is no medio-dorsal series: the fifty-two spines the situation of which I have attempted to describe are very similar to each other; all of them possess a polished and acutely pointed shaft, and all emit a number of lateral bristles: the head and body are black, the spines also black, and the warts white, while the hairs emitted from the surface are gray; the legs are black and shining; the claspers are pitchy brown, with paler extremities; along the top of each clasper is a fringe of gray hairs curving downwards. The CHRYSALIS state is assumed during the first or second week in July, and the transformation takes place, in confinement, on the cover of the vessel, whatever it may be, in which the caterpillars have been fed. They spin little humps or hillocks of silk on the glass cover, and from this suspend themselves by the anal claspers; on the third day the back of the chrysalis may be seen projecting through a slit in the skin behind the head of the caterpillar, and the contrast in colour between the green and newly-formed chrysalis and jet black skin of the caterpillar from which it is now disengaging itself is very striking. In a state of nature the chrysalis may sometimes be found suspended among the leaves of the nettle, but generally on other plants or objects at some distance from its food. The head of the chrysalis has two pointed ears, or rather cases containing the future palpi; these are very distant, and their tips are rather curved outwards; the back has a thin keel, which rises to a point in the middle; the shoulders of the wing-cases are also pointed, and there are two series of sharp points on the dorsal surface of the body, each series consisting of six points, of which the anterior pair, those nearest the thorax, are considerably the smallest. The colour of the chrysalis is green, the cases of the head and wings being bright apple green, and the body ochreous green; all the points are darker: as the chrysalis hardens its colour deepens, but the green tint is never entirely lost. Dr. Lucas, Mr. Merrin, Mr. Biggs, and Mr. West, have most kindly and liberally supplied me with caterpillars expressly for this work.—*Newman.*

TIME OF APPEARANCE.—The caterpillar is to be found on nettles in June and July; the chrysalis in July and August; and the butterfly in August, continuing on the wing more or less abundantly until it hybernates: specimens occurring in the spring have certainly hybernated.

LOCALITIES.—A butterfly of almost universal distribution: as regards Ireland, Mr. Birchall says "it is common in Leinster, Munster, and Connaught, but apparently rare in Ulster;" and as regards Scotland, Dr. Buchanan White observes, "it is by no means common in Perthshire, its sole claim as a native resting on a few specimens taken near the Bridge of Allan: it occurs as far north as

Forres, but except in the very south is a rare butterfly in Scotland." It is present in every English list I have received, and scarcely a correspondent has thought it worth his while to make any observation on its abundance or rarity. It has no predilection for particular situations, except as attracted by flowers, and in the country those of teasels and thistles, and in gardens those of Michaelmas daisies seem especial favourites.

16. Red Admiral (*Pyrameis Atalanta*). Upper side.

Under side.

16. Red Admiral.—The hind margin of the fore wings only is angled, and these very obtusely; all the wings are scalloped; the colour is intense velvety black; the fore wings have a transverse oblique scarlet band from the middle of the costal margin to the anal angle; the females have a small round white spot in this band; beyond this band and nearer the tip of the wing are six snowy white spots of different size and shape; the hind wings have a scarlet band on the hind margin, and in this band are four black spots and one long blue spot at the anal angle. The under side presents such a beautiful combination and blendings of grays, pinks, and browns as Nature only can produce and words cannot describe. My artist and engraver have exerted themselves to the utmost to produce a faithful representation of this wonderful object, and have succeeded as well as human hands can succeed.

Life History.—The egg is solitary, laid in May and June, here and there, on the leaves of the stinging-nettle (*Urtica dioica*): almost immediately after emerging from the egg the little caterpillar draws together the leaves of the nettle, and feeds in concealment; as it increases in size it requires more space, and

continues to increase the size of its domicile up to the period of pupation; I have never met with it feeding exposed: when removed from its retreat it feigns death, bending its extremities together; all its movements are slow and lethargic, and its only object, when exposed, appears to be again to conceal itself. When full-fed the head is broader than the second segment, but narrower than the succeeding segments; it is covered with projecting warts, which vary considerably in size; the body is obese, tapering slightly towards the extremities; the second segment is narrow, having a transverse series of small spines, one of which on each side is somewhat larger and more horny than the rest; the third and fourth segments have each a transverse series of eight spines; one pair on each side is small and inconspicuous; the remaining four are longer, conspicuous and branched, or emitting minor spines, each of which terminates in a bristle; the other segments, from the fifth to the twelfth inclusive, have each seven branched spines, one mediodorsal spine being placed in advance of the rest; the thirteenth segment has four spines. The head is black and rather shining, the smaller points being white, and the larger ones black: the ground colour of the body is generally gray-green, sprinkled with black, and having a rather broad waved stripe on each side just below the spiracles: the belly is smoky flesh-colour; the legs are shining black; and the claspers smoky flesh-colour: such is a description of the usual colouring, but this is extremely variable; the ground colour in some specimens is dingy white, and the lateral stripe scarcely distinguishable; in others it is mottled gray-green, the lateral stripe inclining to yellow; again, in others, the ground colour is intense black, thickly sprinkled with white dots, and the lateral stripe brilliantly white or yellow: again the spines on the third segment are sometimes intensely black, while all the others are smoky flesh-coloured, but in other specimens all the spines are alike dingy and semi-transparent, with black tips. When full-fed it constructs a somewhat more elaborate retreat; it gnaws through the petiole of a leaf, or eats the main stalk of the nettle within a few inches of the top, not quite separating it; the part thus almost separated falls over and completely withers, and this withered portion is formed into a compact retreat, secured from casualties of weather and from the inspection of birds; from the roof of this the caterpillar suspends itself by the anal claspers, and in two days becomes an obese, humped, and angulated CHRYSALIS, the head of which is notched on the crown, the divisions containing the palpi being distant and very obtuse; the thorax has a large dorsal elevation terminating in a median point: on each side near the edge of the wing-cases are two obtuse angles; on the back of the body are three longitudinal series of elevated points; the median series consists of six rather insignificant and inconspicuous points; each lateral series consists of nine points, two of which are thoracic and seven abdominal, the lateral points being much larger and more conspicuous than those of the median series; the anal segment is slender and beak-like, and is terminated by a dense fringe of minute and very acute hooks, by which the chrysalis is suspended from the silk of which the roof of its retreat is constructed: the colour of the chrysalis is reddish gray, delicately reticulated and marbled with black: it appears covered with bloom, like that on a ripe plum, and is adorned with very beautiful golden spots, more especially on the lateral thoracic points.—*Newman.*

TIME OF APPEARANCE.—The caterpillar is found on nettles in June, July, and August; the chrysalis in July and August: the butterfly in August, September, and October. It seems to delight in settling on autumnal flowers and sunning itself on leaves, or in pathways; but the ovary of the female contains no eggs, and she seems to possess no attraction for the male; both sexes hybernate early; they reappear in the spring, but later than our other Vanessidæ: the usual intercourse then takes place, and oviposition follows.

Obs.—This species occasionally departs so far from the ordinary habits of butterflies as to have been detected wandering about by

night. I have repeatedly taken it in October at the sugar prepared for Noctuæ in the garden at Leominster, and Dr. Jordan has recorded, in the 42nd number of the "Entomologist's Monthly Magazine," an instance of its coming to light.

Localities.—It occurs everywhere in England more or less commonly. Mr. Birchall says it is common everywhere in Ireland. It occurs in every list I have received from Scotland, generally without comment on its abundance or rarity. Dr. Buchanan White says it is sometimes not uncommon in Perthshire, but it is variable in the periods of its appearance, one year being abundant and another year very rare.

17. Painted Lady (*Pyrameis Cardui*).

Painted Lady. Var. 1.

17. Painted Lady.—The hind margin of the fore wings is scarcely if at all angled, but, as well as those of the hind wings, decidedly scalloped; the fore wings are variegated with black and pale red; the tip is black, with five snowy white spots of various size and shape; the middle of the wing is red with black blotches; and the base of the wing is beautifully powdered with scales of an orange colour, which glitter like mother-of-pearl; the hind wings are much the same colour as the fore wings, but without the white spots at the tip, and having three rows of black spots parallel with the hind margin; the spots in the inner row are round; in the middle row long and narrow, and in the marginal row rather lozenge-shaped; the under side is very beautifully varied, but does not equal that of its congener the Red Admiral.

Var. 1. In this variety all the usual markings are absent or completely altered in form. The specimen figured is in Mr. Ingall's collection.

Life History.—The egg is laid singly on the field thistle (*Carduus arvensis*), generally towards the end of June, and generally also

low down on the plant, and the young CATERPILLAR emerges therefrom in eight or nine days: it soon draws together the points of the thistle-leaves with a very slight web, more like that of a spider than the usual webs concealing *Lepidoptera*, and thus, very imperfectly concealed, it feeds with great voracity, and grows so rapidly as frequently to be full fed in fourteen days, when it rests in a straight position, but falls from its food-plant, forming a compact ring, if annoyed. As the caterpillar increases in size it ascends towards the flower-head, leaving its prior domicile, so that half-a-dozen of these dwellings may sometimes be found on one plant, but two caterpillars rarely, if ever: the needles or spines of the thistle-leaves, always rejected as food, are suspended in the web; the excrement of the caterpillar is also found abundantly in the web, showing that, in a sanitary point of view, the Painted Lady stands rather low. The head is fully as wide as the second segment, and scabrous, the crown is bilobed, each lobe emitting several warts and numerous bristles. The body has the segmental divisions clearly marked, and a lateral skinfold not very strongly pronounced; the second segment has numerous short dorsal spines, each of which emits a terminal bristle; both the third and fourth segments have two longer lateral spines emitting lateral branches; the remaining segments from the fifth to the twelfth, both inclusive, have seven branched spines, one of them mediodorsal and slightly in advance of the rest, the third on each side is on the skinfold: below the skinfold and above each clasper is a conspicuous sesquialterous wart, emitting curved bristles: the thirteenth segment has four spines placed in a quadrangle, the posterior pair larger and more conspicuous than the anterior pair; all parts of the body emit scattered hairs. The colour of the head is dull black; the dorsal surface of the body is black, the spines paler, with black tips and branches; the hairs are white; the skinfold separating the dorsal and ventral surface is yellow; the ventral surface, legs, and claspers are pitchy red; the spiracles above the skinfold are pale in the middle; then surrounded with black, then again with paler. In many individuals the dorsal surface is irrorated with yellowish white dots, which are more conspicuously collected in a double series along the back, interrupted by a narrow mediodorsal stripe intensely black; in these examples the bulbous base of each spine is pitchy red. When full fed the caterpillar spins a small but dense patch of silk on the surface of any object within reach, and, suspending itself therefrom by means of its anal claspers, changes to a CHRYSALIS, which has the head broadly truncate, but not cared; the back of the thorax is produced into a median point, and has a point on each side in advance of the median point, and two more prominent points on each side on the margin of the wing-cases; the body has three series of obtuse points, the mediodorsal series consisting of six points, the lateral series of eight points, the anal extremity produced into a slightly curved beak-like process, which is terminated with a fringe of minute hooks, by which it is suspended. The colour is ochreous-gray, striped with dingy brown, and adorned with gold reflections; the dorsal points are golden metallic yellow; there is a spear-shaped black mark between the tips of the wing-cases, apparently covering the extremity of the maxillæ; the cases of the antennæ have a double series of black dots; the anal beak has on each side a conspicuous black stripe, and various parts of the wing-cases and abdomen have distinct black dots.—*Newman.*

TIME OF APPEARANCE.—The caterpillar is to be found in June, the chrysalis in July, and the butterfly in August—but the sexes appear to take little notice of each other, and may be seen frequenting gardens, or settling in roads, or on the blossoms of thistles and teazles by the road-side, until the end of October, when they retire to their winter-quarters, again to appear in April, May, and June: copulation then takes place, and oviposition follows during eight or ten succeeding days.

Obs.—There is something very exceptional in the conduct of this species; something that renders it impossible to lay down with precision any rules for the appearance of either caterpillar or chrysalis; with regard to the

butterfly, appear when it will, it never seems to be out of season. Although the preceding paragraph is offered as a summary of very numerous observations, still it can scarcely be considered as sufficient or satisfactory, since the insect itself seems to consider no laws binding, and the simple question whether, as a rule, one, two, or three generations are disclosed during the year still remains without solution. The "Entomologist," which has done so much to cherish the science of entomology, and to extend the researches and investigations of the true lover of Nature beyond the drawers of a cabinet or the technicalities of the pedant, has, during its useful career, given us abundant evidence of this. Thus we find, at p. 305 of the second volume, even that excellent observer, Mr. Pristo, confessing himself at fault on this important point of its life-history:—"I am in a fix at present about the economy of this species: there are small and nearly full-grown caterpillars feeding together now; in fact, only yesterday, September 19, one spun up, and another—a very small one—changed its skin. Whether these late caterpillars are produced by the early butterflies of this year or the late ones of last year I am unable to determine. I believe all will produce the perfect insect this autumn." Mr. West, another of our very best observers, has, at p. 363 of the third volume, a very similar record:—"The caterpillars of *Pyrameis Cardui* have appeared in this neighbourhood for the second time this season. I have enclosed a few in a box, thinking you may be interested in the appearance of a second brood. Between the 26th of July and the 16th of September I could not find a single caterpillar. On the 16th of September I took four dozen very small caterpillars, and on the 24th about three dozen, some of them full fed." During the same year I received, through the kindness of Mr. Pristo, early caterpillars, and these accomplished their metamorphosis early in the autumn, but no approach towards a second brood was made by the butterflies.

Localities.—Truly cosmopolitan, but intermittent and irregular. I have sometimes passed years without seeing a specimen; at other times it may be said to swarm on the blossoms of clover (*Trifolium*), sainfoin (*Hedysarum Onobrychis*), and lucerne. Mr. Birchall says it is common everywhere in Ireland, and is often found on the summits of mountains; and Dr. Buchanan White informs us that in Scotland it occurs from the sea-level up to the base of Ben Lawers. In Wales I have observed it at the Menai Straits, and up to the stone cairn on Snowdon. In England I know of no locality where it does not occasionally appear, but mostly in small numbers. A few exceptions occur, and I will cite one of them.

Mr. F. Smith, of the British Museum, the illustrious historian of British Bees and British Fossorial Hymenoptera, has published, in the 19th number of the "Entomologist's Monthly Magazine," the following vivid picture of an entomological treat he enjoyed at Ilfracombe in October, 1865:—At the western extremity of Ilfracombe stands a parish church, passing behind which you enter a narrow lane—"a Devonshire lane"; its beauty will be appreciated by everyone who has visited Devon, and he will thoroughly understand the meaning of the above appellation—he will know how it winds, and turns, and winds again—just so does the lane at the back of the church, until you arrive at a gate at its extremity that opens to the breezy downs. The last fifty yards of the hedge, on the right hand of the lane, is covered by a mantle of ivy, which, on the 9th of October, was in full blossom, but the flowers were almost hidden from sight by a countless multitude of butterflies and moths; it was one of the most beautiful sights I ever beheld. The multitudinous host only comprised two species of butterfly, *Pyrameis Atalanta* and *P. Cardui*—scores of the former, but hundreds of the latter. The majority of them appeared to be so overpowered by imbibing the nectar of the ivy-blossoms, that I had no difficulty in taking specimens of Cardui between my fingers.

Many unsuccessful attempts have been made to discover some law by which to account for the irregular appearance of this insect.

Family 4.—White Admirals (in science *Neptidæ*).

The heads of the caterpillars are exserted and shield-like; the face is generally flattened and beset round the margin with strong spines, particularly observable on the crown; the body is of nearly uniform size and beset with branched and often clubbed spines; they feed on a variety of plants. The chrysalids are always angled, and sometimes humped in a very extraordinary manner. The head is always cared. The perfect insect has but four legs, the anterior pairs having no claws, and being unfitted for walking. The wings are not angled, but scalloped. We have but one genus inhabiting this country—*Limenitis;* but in the East the genera and species are most abundant.

18. White Admiral (*Limenitis Sibylla*). Upper side.

Under side.

18. The White Admiral.—The wings are scalloped but not angled, their colour is rusty black; the fore wing has about a dozen white spots, very various in size and shape; the hind wings have an oblique transverse median white band. The markings on the under side are exceedingly beautiful and complicated, almost vying with those on the under side of the Red Admiral.

Variety of White Admiral. Upper and Under sides.

Varieties.—An extraordinary variety of this species occasionally occurs in which not a trace of the usual markings is to be found on the upper side, a uniform sooty black being diffused over the whole surface. The under side is equally abnormal. The beautiful specimens figured are in the rich cabinet of Mr. Bond, and are kindly lent expressly for this work.

Life History.—In July the pregnant female is seen hovering over the thickest parts of our taller copses, wherever the stems of the honeysuckle are imbedded, like petrified snakes, in the upright stems of the hazels, and the foliage of that sweet climber has surmounted the hazel spray, and its blossoms are gaping wide in the sunshine, and diffusing their delicate fragrance on the summer air. The actions and movements of a female butterfly when engaged in the maternal duty of oviposition are very different from her ordinary gait when sailing over the opening blossoms of the bramble in company with friends, lovers, and kinsfolk. It is evident to the eye of the naturalist that she is now on weighty affairs of business; there is no time lost, none of

those flirtations and love-chases so much admired and so glowingly described by our predecessors in the study of entomology. Her flight is slow, flagging, flapping, and only from leaf to leaf. She selects with unerring discrimination the leaves of the honeysuckle, even when surrounded, and apparently half smothered, with the foliage of the hazel, and lays a single EGG on the upper surface of a leaf; she then flutters off to another, then to another, never tiring, never hesitating which leaf to choose, but always directed by an unfailing instinct to the honeysuckle, and always avoiding those leaves on which an egg has already been deposited. The egg is something the shape of an orange, only flatter at the poles, and has been compared to those sea-urchins or sea-hedgehogs which are found on the sea-beach, and are to be seen in the window of every shell shop. In fourteen days the little CATERPILLAR comes out of the egg-shell, and toddles to the very tip of the leaf before it begins eating, and then it nibbles away day after day, eating the green part, and leaving only the midrib sticking out like a bristle, and always after a good meal of leaf it goes to the very point of this bristle, and there rests while its meal digests and while it acquires strength for future attacks on the same leaf. Day after day the alternate processes of eating the leaf and resting on the tip of the bristle-like midrib continue, until three-quarters or rather more of the leaf has been eaten, and then it knows that its devouring duties for the year are over. We all know that the leaves of the honeysuckle are deciduous, and, in the course of Nature, would fall off before winter; this, however, would not suit the requirings of the juvenile caterpillar, which, having once fallen to the ground with the fallen leaf, would inevitably perish. To prevent this falling is absolutely necessary to the existence of the caterpillar, and therefore to the preservation of the species; how then is this to be accomplished? The caterpillar, by spinning a number of silken threads wound round and round the twig, and round and round the leaf-stalk, fastens the leaf-stalk to the twig to which it is still attached. The next process is to make a winter habitation of that portion of leaf that still remains uneaten; the corners of this uneaten portion are fastened tightly together, and then the edges are united, these operations being effected by means of silk spun from the mouth; the work is then finished, and the little caterpillar is thus laid up for winter quarters inside his hammock, the bristle-like midrib of the leaf curling over it like a tail. Now the process of fastening the leaf to the twig by silken cables has done nothing to prevent the natural dehiscence of the leaf-stalk at its base, so that this inevitable process takes place at the appointed time, and then the little cot, instead of standing erect, falls as far as the cables will permit, always less than half an inch, and rocks to and fro all the winter, lulling the infant caterpillar to sleep, and keeping him asleep for six consecutive months; rain, snow, ice, wind, and all the vicissitudes of our winter, have no power to injure or even to awaken him; hung aloft in his little cradle he rocks in comfort and security, and rides out the roughest storm without a thought of harm. In April he wakes up. The same increase of temperature which poets tell us rouses "the torpid sap detruded to the roots"—a very apocryphal doctrine, by the way, as the change of temperature is more likely to be felt in the air than in the earth: however, the same change of temperature which compels the leaf-buds to burst also resuscitates the little caterpillar; he wakes up, crawls out of his hammock, and commences operations on the expanding leaves. He now no longer confines himself to the tip of the leaf, but feeds away, with all the voracity which a winter's fast may be supposed to have engendered, during nearly the whole of April and May; and by the 1st of June is full fed.

The head is about the same width as the second segment, but decidedly narrower than those which follow; it is held in a prone position, looking downwards; the crown is slightly notched, and from each division arises a spine almost erect but slightly bent backwards; the face is flattish and rough, with small warts and short simple spines: the body is almost

uniformly cylindrical, but the segments are slightly swollen, and the incisions between them marked with decision; the dorsal surface is shagreened, the lateral surface more strongly so, the inequalities almost amounting to spines on the slightly dilated skinfold; there are also circles of similar small spines round each of the claspers, and a transverse series on the ventral surface of each segment, but the most striking armature of the caterpillar is on the back; the third, fourth, sixth, eleventh, and twelfth segments have each two conspicuous erect spines placed side by side; the fifth, seventh, eighth, ninth, and tenth segments have each two shorter spines, and the thirteenth segment has four still shorter and smaller; all these spines are branched or rather bristle-bearing. The colour of the head is pinkish-brown, with a darker longitudinal line down each side of the face: the body is dark green on the back, paler on the sides, and the little warts causing the appearance of shagreen are yellow; under a lens they have the appearance of yellow grains of sand; the spiracles are white, and there is a narrow but very decided white side-stripe below the spiracles; on each side of each segment is a yellowish blotch; the spines are pink at the tip, reddish brown below, and paler at the base; their bristles are black; the ventral surface is apple-green approaching to glaucous at the incisions of the segments: the legs are obscure brownish green; the claspers are rather paler and their disks pink. When full fed it spins a silken web over the under surface of a leaf of the honeysuckle thickened into the form of a pad on the midrib; and attaching itself to this by the anal claspers, it suspends itself in a curved position waiting for the change to a CHRYSALIS. Mr. Buckler graphically describes the change as follows, in the 38th number of the "Entomologist's Monthly Magazine":—"In the course of the third day the creature seems to wake up, unbends its head, swings itself to and fro a few times, then stretches itself downwards in a long attenuated line, which causes a rupture of the skin close to the head, which is seen slowly to ascend, exposing the bare and soft shining parts below, from which a flat and forked pair of horns grow out perceptibly as one beholds this wonderful process; the skin continues to glide slowly upwards; and as the soft parts become exposed they are seen to swell out laterally, and assume the very singular projections of the chrysalis; the skin of the old head gliding up the belly marks the progress of the disclosure, as the colour of the old and new surfaces are at this time alike, but the new rather more shining and semi-transparent; occasionally, during the bulging out of the soft parts, a kind of convulsive heave or two occurs, but otherwise it remains still until the creature is uncovered as far as the ninth or tenth segment; it then curves its anal extremity by a sudden twist laterally, and in a moment dexterously withdraws the tip of the anal segment from the claspers by an opening on the back of the skin at that part; at this critical moment one has time to see that the naked, shining point is furnished with black hooks, and to expect its fall, but in another moment it has forcibly pressed the curved tip with its hooks against the stem, close to its previous attachment of the anal claspers, which has proved strong enough for the occasion. The creature now seems endowed with wonderful power and vigour; it swings boldly to and fro, and undulates itself as if to gain longer swings, when presently the old skin that remains is seen to burst away and fall off, the chrysalis gradually becoming quiescent. The entire metamorphosis, from the first waking to the last movement, occupying nearly seven minutes. The chrysalis is very angular, and its wing-cases very projecting; the dorsal surface of the thorax rises to a prominent ridge, and a little beyond it is a flat, round, and very projecting process; on the back, and from thence to the anal tip, the abdomen is slightly sinuous, and, therefore, hangs a little on one side; two flat forked processes project from the head. Its colour at first is a greenish-white, but it gradually darkens, and in a few days the thorax and wing-cases are deep olive-green, the centre of the back of the abdomen bright apple green, its tip and underside being dark brown, which

forms on the back a broad band, including the flat circular prominence at its termination. The hare's-ear-like projections at the head are also dark brown; the wing-rays can be seen distinctly, the portions that at first appeared quite white have now been transmuted into metallic adornments, a brilliant golden streak divides the brown colour from the green of the wings, commencing on each side the back of the thorax, and a spot on each side the tip of the tail; three silvery spots decorate the under side of the body, and the head and its prominences are embellished, both above and beneath, with similar spots and streaks."

Obs.—I must here observe that we are indebted to Mr. Hunter for the first description of the caterpillar and chrysalis of the White Admiral from English specimens: it was published at page 3185 of the "Zoologist" for 1851. The descriptions by Curtis and other British authors, copied from Hubner, refer to another species (*Limenitis Camilla*) not yet found in Britain: the error originated in the fact that Haworth applied the name *Camilla* by mistake to our English insect. A second and much more detailed description of this caterpillar, by Mr. H. L. de la Chanmette, is published at page 3237 of the same volume, and a description of the caterpillar of Camilla is given to show the difference between the two species; but both descriptions are from Swiss specimens; mine are from English specimens.

Time of Appearance.—The caterpillar is to be found hybernating in the winter, and full fed at the end of May and beginning of June, the chrysalis at the end of June, and the butterfly in July. It is fond of settling on brambles, but distinguishes itself by a most graceful flight up and down the roads in woods.

Obs.—"The graceful elegance displayed by this charming species when sailing on the wing is greater perhaps than can be found in any other we have in Britain. There was an old Aurelian of London so highly delighted at the inimitable flight of Camilla [Sibylla], that long after he was unable to pursue her, he used to go to the woods, and sit down on a stile, for the sole purpose of feasting his eyes with her fascinating evolutions."—*Haworth.*

Localities—This butterfly is absent from the Irish, Manx, and Scotch lists, and from most of the English ones. The following localities have been received:—

Buckinghamshire. Black Park: a very favourite locality fifteen years ago, but now closed against entomologists—*S. Stevens and many others.*

Dorsetshire. Parley Heath and Bere Wood—*Rev. O. Pickard-Cambridge.* Mr. Dale gives this information with a query.

Essex. Parkhall Woods, near Epping, sparingly; near Colchester in profusion—*Edward Doubleday;* St. Osyth—*W. H. Harwood;* Saffron Walden—*W. R. Jeffrey.*

Gloucestershire. A single specimen at Clifton, near Bristol.

Hampshire. One near Winchester, 22nd June—*J. S. Wesley;* near Andover, 23rd June—*J. T. Moore;* Woods near Horndean, abundant—*H. H. Crewe;* near Lyndhurst and Brockenhurst—*F. Bond;* occasionally taken in the New Forest, but never common—*G. B. Corbyn;* in oak woods near Portsdown—*Henry Monereaff;* Emsworth—*W. H. Draper;* Woolmer Forest—*C. G. Barrett.*

Kent. Tenterden—*Stainton's "Manual."*

Lincolnshire. Common in the south of the county in fine seasons—*T. H. Allis.*

Northamptonshire. The Lynches, near Wodenham—*F. Bond.*

Suffolk. Bentley, Coomb, &c.—*H. H. Crewe.*

Surrey. Haslemere—*C. G. Barrett.*

Sussex. Near Steyning—*J. H. White;* at Iden, near Rye, the only place I have ever seen it—*E. Jenner;* Ashling—*W. H. Draper.*

Wight, Isle of. Generally distributed in our woods—*James Pristo;* Parkhurst, Apse Wood, and Whitefield Wood—*Alfred Owen;* Ryde—*W. H. Draper;* Brading, 24th July—*J. D. Pinnock.*

Worcestershire. Worcester—*Stainton's "Manual."* My entomological correspondent at Worcester, who has taken the utmost pains to supply me with information, does not confirm this report.

Natural Order II.—Slug-shaped Caterpillars (in science (*Limaciformes*).

The distinguishing character, and that to which we have no exception among the British species of the Order, is the slug-like form of the caterpillar: it is generally covered with minute warts, giving the surface the appearance of very fine shagreen; it is without spines, and the body terminates in two points, which are directed backwards. The chrysalis is angled, but not sharply so; its head is broad, often as though cut off abruptly: in some species it is rounded or very blunt; in others it has two rather distant short points, generally described as ears; it is always, or almost always, suspended by the tail, and hangs head downwards. The perfect insect has the fore feet totally unfitted for walking, and without claws. The British species are divided into two families.

Family 5.—Emperors (in science *Apaturidæ*).

The caterpillar is very stout in the middle, but more slender towards the head, the crown of which is produced into two horns (which are usually directed forwards when the creature is crawling), and very much, although gradually, tapered towards the tail. The chrysalis is always suspended by the tail; it is stout but rather compressed on the sides; its head is divided into two blunt points or ears. The perfect insect has only four perfect legs, and has very gradually thickened antennæ, ample wings, and a most powerful flight. We have but one British genus or species, commonly known as the Emperor (in science *Apatura Iris*).

Obs.—The word *Apatura* is probably misprinted for *Apodura*, signifying that the caterpillar has no feet at the tail or caudal extremity—a very striking character, but not confined to this particular genus, as will be seen in my descriptions of the Satyrs: the spelling cannot now be altered, having been so generally adopted.

19.—Purple Emperor (*Apatura Iris*). Upper side of Male.

19. Purple Emperor.—The antennæ are rather long, and the club very gradually thickened: the fore wings are slightly arched on the costal margin, rounded at the tip, and without angles on the hind margin: the hind margin of the hind wings is scalloped, and the anal angle produced: the ground colour is rusty-black, the male being decorated with a purple lustre, which, in certain positions, is very beautiful; the female is without the purple gloss; on the fore wings are seven white spots, the position of which will be seen in the figure; it has also a portion of a transverse white band, which commences near the middle of the wing, proceeds to the inner margin, and is continued obliquely across the middle of the hind wings; in the male these markings are pure white, in the female they are tinged with yellow: there is a faint and undefined bar parallel to the hind margin of all the wings; the anal angle is tinged with rust-colour; and near the anal angle is an ocellated black spot, with a blue pupil and a rust-coloured circumscription. The under

side is very different from the upper, as will be seen from the very perfect representation given below: the general tint is dull rust-colour, shaded to gray along the hind margin of all the wings: on the costal margin of the fore wings are two white blotches, one near the middle, the other smaller, and half way between the middle and the tip: between the larger white costal blotch and the base is a vague whitish space, containing two transverse black markings; towards the anal angle is an eye-like spot, black with a blue pupil and a broad rust-coloured circumscription, which is interrupted by two

Under side of Female.

white spots; between this eyelike spot and the base is a short transverse white bar, extending from near the middle of the wing to the hind margin: the hind wings have an oblique wedge-shaped median white band, the base of the wedge resting on the costal margin; there is a small blue-pupilled spot below this band, and equidistant between the hind and inner margins.

Varieties.—This insect is liable to variation,

Upper side of a variety in the cabinet of Mr. Bond.

which shows itself particularly in the absence or partial absence of the white spots and band.

At page 5923 of the "Zoologist" for 1858 the Rev. William Bree describes such a variety in these words:—"On the 13th of July, 1857, I had the good fortune to capture, in Ashton Wood, near Oundle, Northamptonshire, a very singular and interesting variety of *Apatura Iris*. There is an entire absence of the beau-

tiful white band which in ordinary specimens, crossing the middle of the hind wing, extends into the middle of the fore wing: of the five white spots extending in a curve from the costa to the anal angle, one spot only, namely the fourth, is visible; the two spots near the tip are smaller than usual, the second of the two being little more than a speck; the costal margin and the tip are strongly powdered with fulvous, and the usual fulvous ring of the hind wing being broken on its lower side extends in a strong fulvous marking over the anal angle: the rich purple shade is spread over the wings as in the ordinary specimens, blended, however, in parts with fulvous. The under side is equally remarkable, though difficult to describe; the colouring and markings are much confused."

A very beautiful example of this variety is figured on the opposite page. It is in the cabinet of Mr. Bond, and has been most kindly lent purposely to illustrate this work.

Life History.—Dr. Maclean, to whom I am indebted for the early history of this butterfly, watched a female deposit two eggs on the upper side of two leaves of the sallow, or great goat-willow (*Salix caprea*), on the 16th of July: the egg somewhat resembles a fossil *Echinus* which has lost its spines. One of these eggs the doctor took home, and it hatched on the 25th of July, just nine days after it was laid: the egg left on the leaf where its parent had deposited it, hatched on the 28th of the same month, having been in the egg state twelve days. The little caterpillars are of a dark brown colour: on the eighth day after being hatched they change their skin, and then are furnished with two horns or processes, attached to and forming part of the head; and it is curious that now, on the first appearance of these horns, they are proportionally larger and longer than at any other period of the creature's caterpillar life, and are evidently, although not deeply, cleft at the tip. With the first change of skin the caterpillar loses every tinge of its original brown colour, and becomes exactly of the same hue as the sallow-leaf on which it feeds: a portion of the leaf is consumed every day, but the mid-rib is left intact; and the little creature, when resting from its alimentary labours, climbs to the denuded bristle-like tip of this mid-rib, and there remains perfectly motionless, with the anterior extremity raised as we see it in the caterpillars of the privet hawk moth and the puss moth. Dr. Maclean's caterpillar continued this mode of life until the 15th of November, when it descended from the leaf, and, covering with silk the rind of the twig immediately below the attachment of the leaf, grasped this web firmly with its claspers, stretched itself out at full length, with its horns porrected before it, and thus settled itself down to endure the winter's cold and the winter's storms. This is always the case; its *modus operandi* is the same whether in a state of nature or in the vivarium of an entomologist. Instinct, that infallible and inscrutable guide, tells the unreasoning caterpillar that dehiscence of the leaf-stalk will take place after the first frost, and that the leaf will fall to the ground: the leaf does fall, but not until its falling is a matter of indifference to the caterpillar; not until the caterpillar has attached itself so firmly to the twig that neither wind nor rain can remove it. In the ensuing spring, the same influences which compel the sallow to throw out new twigs and new leaves also resuscitate the torpid or dormant caterpillar; its eating propensities are aroused, and it feeds greedily until the period of its first metamorphosis has arrived.

The full-fed caterpillar rests on the sallow leaf in a nearly straight position, holding on by its claspers to a little silken coating which it spins on the under side of the leaf; but when feeding it bends its somewhat obese body with the facility, and I would almost say *elegance*, of a slug, but I fear many of my readers will scarcely appreciate the comparison. When annoyed, it contracts and incrassates its body, assuming a very lumpy appearance: the head is so exactly the same width as the second segment that it appears continuous therewith; the face is rather flattened, and the crown slightly notched, and produced into two slug-like horns, which are

of nearly equal size throughout, but are very slightly incrassated towards the tip; they are rough, with raised points, more particularly on the under side; these strange appendages move *with* the head, but possess no capacity for motion independently of the head; when the mouth is stretched out, as in feeding, the horns point backwards, but when the mouth is brought up to the chest their position is exactly reversed, and they point forwards; the width of the face is nearly the same at the mouth as at the forehead: the body is slug-shaped, tapering to both extremities, more particularly to the caudal extremity, which terminates in two short, parallel, closely approximate points, directed backwards; the surface of the body is rough, like shagreen, a character due to transverse series of warts, one of which series is on each section of a segment, and a fifth on a rather conspicuous skinfold which intervenes between the segments.

The colour requires a rather minute description; the horns may be called glaucous green, inclining to blue in front, to white behind, and to black at the tips; the space between them is of a pale yellow colour, approaching to white, but there is a pointed triangular green plate above the mouth, which enters into and almost divides the yellow part: I have said that each horn may be called white behind, thus presenting a white stripe from near the tip to the base; this white stripe is continued on the second, third, fourth, and partly on the fifth segment, where it fades into the general green colour of the back; on each side of the body is a very narrow yellow stripe traversing the region of the spiracles, extending the entire length of the caterpillar, and terminating in the anal point; there are, moreover, seven oblique lines on each side, all of them commencing near the lateral stripe which I have just described, and running upwards and backwards, but not meeting on the back; the third of these oblique lines is the longest, reaching nearly, but not quite, to the middle of the back; this line is also rather stouter than the others; they are all of a yellow-white tint, the third being rather conspicuously bordered at the upper anterior extremity with purple; the ventral surface is glaucous green, and the legs and claspers are nearly concolorous. When full fed the caterpillar fastens itself by the anal claspers to a silken carpet it has previously spun on the under side of a sallow-leaf, and, thus suspended, changes to a CHRYSALIS, which is obese, dumpy, awkward-looking, somewhat compressed laterally, and somewhat keeled dorsally: the head terminates in two approximate short points or ears: the colour is apple green, the wing-cases being rather darker, and the body rather yellower, and the seven oblique lateral stripes which I described in the caterpillar are still to be observed on the sides of the chrysalis.

TIME OF APPEARANCE.—The full fed caterpillar in May and June, the chrysalis in June, and the butterfly in July.

Obs.—The Purple Emperor has achieved a great reputation among English entomologists for his lofty flight, and the extreme difficulty of securing him with the hand-net. Haworth says, "The Emperor invariably fixes his throne upon the summit of a lofty oak, from the utmost sprigs of which on sunny days he performs his aerial excursions, and in these he ascends to a much greater elevation than any other insect: I have even seen him sometimes mounting higher than the eye can follow; especially if he happens to quarrel with another Emperor, the monarch of some neighbouring oak: they never meet without a battle, flying upwards all the while, and combating with each other as much as possible: after which they will frequently return again to the identical sprigs from which they ascended. The wings of this fine species are of a stronger texture than those of any other in Great Britain, and more calculated for that gay and powerful flight which is so much admired by entomologists. The Purple Emperor commences his aerial movements from ten to twelve o'clock in the morning, but does not perform his loftiest flights till noon, decreasing them after this hour until he quite ceases to fly about four in the afternoon: thus emulating the motions of that source of all his

strength, the sun." Let us next consider another phase of imperial life presented to us by Mr. Hewitson, at page 315 of the first volume of the "Entomologist":—"At the end of a long and very rapid flight at the outskirts of the wood they (the Emperors) would enter its more shaded recesses, and settling wherever moisture was to be met with, would protrude into it their thin long trunks, and were soon heedless of my approach. I found a flat, bagless net by far the best when their wings were thus expanded, allowing them no room for motion. Instead of employing their sunny hours in sipping sweets, and

'Gathering honey all the day
From every opening flower,'

their delight was to extract the juices of each swamp-hole, and the filthier the puddle the more it seemed adapted to their taste. Herds of swine are brought to pasture on the borders of the forest, and it was their droppings that seemed to supply the Purple Emperors with their choicest feast. Seating myself near one of these, I selected the finest specimens as they settled down, and watched them till they closed their wings; and so intent were they on their occupation that they would usually permit me to take them between my finger and thumb. They were so numerous that I have had no less than seven under a small net at one time, and even then they showed but little anxiety to get away." Again, Mr. Sturgess writes thus, at page 59 of the second volume of the "Intelligencer":—"You may judge how agreeably surprised I was to learn, one scorching day in July, that the Purple Emperor had been caught regaling himself upon the imperial delicacies of dead stoats, weasels, &c., hanging upon some low bushes as a terror to evil-doers. I need not say that I did not neglect the first opportunity of visiting the spot, and had the satisfaction of seeing within the space of an hour three Emperors descend from their thrones to breakfast upon the delicious viands." And again, Mr. Russell, writing from Ashford, in Kent, informs us, at page 139 of the same volume, "that on the 18th he captured two males of this insect in fine condition, one of them from the head of a dead cat nailed to a lodge in the wood." A few pages further on in the same instructive journal (page 155) Mr. Sturgess again reports progress thus:—"Some of your readers may be glad to learn the result of the captures indicated above; I believe the following is a correct list:—On the 11th of July three specimens; on the 13th, six; on the 14th, seventeen; on the 15th, twenty; on the 16th, eight; on the 17th, six; on the 18th, fourteen; on the 23rd, three; and on the 24th, three; making a total of eighty specimens in nine days. The experiment was not tried in the same place as last year, but in a wood of some thirteen hundred acres, where the Emperor appeared to be more plentiful: the keeper kindly consented to nail a portion of rabbit-skin and the wing of a bird to the end of a house; a similar bait was also placed on a lime heap about a dozen yards distant." Here is sufficient evidence of the kind of delicacies best adapted to the imperial palate: an adaptation which, however I may regret, I am unable to dispute. I would gladly have depicted the Emperor of our insect world as banqueting on ambrosia, an esculent of which, by the way, I have no clearly defined idea, or quaffing the nectar of flowers, but this would not be truthful: in this and other cases of depraved appetite, we can only lament a fact as incontrovertible as it is unsatisfactory, repeating the somewhat trite, but ever sapient axiom, *de gustibus non est disputandum.* I am able, however, to assign his imperial majesty one instance of more refined taste—Dr. Knaggs records, at page 165 of the fourth volume of the "Entomologist's Weekly Intelligencer," that he succeeded in decoying an Emperor by painting the trunk of a tree with sugar, and thus secured him.

Localities.—This beautiful insect is unknown in Ireland, Scotland, and the Isle of Man, and its range in England is restricted to the oak woods of the midland, eastern, and southern counties. I give a list of the localities it is known to visit:—

Bedfordshire. Clapham Park Woods—*Stainton's "Manual."*

Berkshire. Burghfield, near Reading—*C. S. Bird.*

Buckinghamshire. At Claydon I observed several specimens flying about the tops of the oaks in the woods here last month (August), but although I procured a pole about twenty feet long for my net I was unable to take any—*H. H. Crewe.*

Cambridgeshire. Woods near Cambridge—*Thomas Brown.*

Devonshire. Occurs occasionally near Barnstaple, North Devon—*G. F. Mathew.*

Dorsetshire. Woodland Wood, near Hanford, the seat of the late H. Seymer, F.L.S., and near Cranborne—*J. C. Dale.*

Essex. Very rare at Epping, but common at Colchester—*Edward Doubleday*, in 1833; formerly common in the High Woods, Colchester, but I have not seen a specimen since 1860, and it has disappeared from all the other woods where it formerly occurred in the vicinity of Colchester. The last specimen taken here was flying round a moderator lamp in the evening, in the town itself. It still occurs at Coggeshall, and in Storr Wood, near Ramsay—*W. H. Harwood;* Saffron Walden—*W. R. Jeffrey.*

Gloucestershire. Forest of Dean—*W. Langley.*

Hampshire. Near Lyndhurst and Brockenhurst—*F. Bond;* occasionally in the New Forest, but uncommon—*J. B. Corbyn;* Burton, near Christchurch—*J. C. Dale;* Southwick—*Henry Monereaff;* Emsworth.—*W. H. Draper;* Ringwood.—*W. G. Wilkinson.*

Huntingdonshire. Monkswood and Brampton Wood, not uncommon, but very difficult to capture—*J. H. White;* Woods near Peterborough—*F. Bond.*

Kent. Tenterden—*S. C. Tress Beale;* Darenth Wood—*William Machin;* Perry Wood, Selling—*H. A. Stowell;* it is stated to occur in the woods round Pluckley, but I cannot report this from personal knowledge—*W. O. Hammond;* Knowle Park, near Sevenoaks—*Stainton's "Manual";* in the town of Ashford, settling on the front of a house—*A. Russell.*

Leicestershire. Leicester—*Stainton's "Manual."*

Lincolnshire. About Lincoln, Bardney Wood, and in South Lincolnshire—*T. H. Allis.*

Middlesex. Caen Wood, near Hampstead—*J. F. Stephens.*

Monmouthshire. In the Forest of Dean—*W. Langley.*

Northamptonshire. "Early in the morning, and on damp, gloomy days, I have several times seen to the greatest advantage, as I conceive, the most splendid of all our butterflies (*Apatura Iris*) at Barnwell and Aston Wolds, sailing along the ridings, and settling upon the ruts and other moist and muddy spots, often assailed by the impudent attack of *Epinephele Janira* and *Melanagria Galathea*, which appear to be the foremost in attacking him when he thus condescends to leave for a while his lofty oak to visit the regions inhabited by his less honourable kindred. The partiality which this insect exhibits for individual sprigs of particular trees has often been remarked upon by entomologists, and is certainly confirmed by the Emperors of this neighbourhood. And it should almost seem as if this partiality were, if I may use the expression, hereditary; for upon a certain sprig of a small ash tree, by the side of one of the ridings in Barnwell Wold, I have each year since 1847 succeeded in capturing the Purple Emperor; and in all instances, upon the capture of one, the identical sprig has in the course of a few days, if not within a few hours, been invariably occupied by another Emperor"—*William Bree;* the Lynches—*F. Bond;* Kettering—*William Sturgess.*

Nottinghamshire.—Occurs occasionally at Ollerton; in 1859 I had a fine female given me alive. It was taken inside a pigsty near the edge of Willow Wood, three miles from Ollerton—*R. E. Brameld;* occasionally near Newark—*George Gascoyne.*

Somersetshire. A friend informs me he has taken *Iris* at Clive Coombe, about two miles from Bristol—*F. D. Wheeler;* a specimen reported from Brockley—*W. H. Grigg.*

Suffolk. Bentley, Coombs, &c.—*H. H. Crewe;* Redisham and Wolsingham Parks—*W. M. Crowfoot;* in Old-hall Wood very rare, Haverhill—*William Gaze;* Assingham Wood, near Sudbury—*John Grubb;* so common near Ipswich in 1868 that many of our collectors have taken eight or ten dozen each —*Garrett Garrett.*

Surrey. Haslemere—*C. G. Barrett;* formerly abundant near Godalming. The late Mr. Howard, of Elstead, used to take the females in his garden resting on the trunks of trees. I have seen at least a dozen so taken: the males were seen flying about the oaks, but I did not hear of one being taken—*E. Newman.*

Sussex. Poyning's Wood—*W. Buckler;* Plashet, between Balcombe and Newick, and elsewhere in the woody district of the Weald —*E. Jenner;* Chichester—*W. H. Draper;* Brighton, Bourne, and Ticehurst—*Stainton's "Manual."*

Wight, Isle of. Has been taken at Freshwater and Brading—*J. Pristo;* near Yarmouth—*F. Bond.*

Wiltshire. Said to have been taken in Savernake Forest, but this is very doubtful—*T. A. Preston.*

Obs.—A great deal which I thought it unnecessary to transcribe has been written as to the mode of capturing the Emperor with a net on the end of an enormously long pole: I know of no record of success with this strange instrument, and cannot imagine myself possessed of the power to use it. The unsavoury baits already described seem to offer a more likely chance of capture.

Family 6.—Satyrs (in science *Satyridæ*).

The caterpillar is without spines, but is covered with minute warts, which impart to the surface a velvety appearance; it is nearly cylindrical, but tapers towards both extremities, more particularly the caudal extremity, which terminates in two points directed backwards: the chrysalis is scarcely at all angled; the head is broad and obtuse; it is generally suspended by the tail, but sometimes lies without any attachment on the surface of the ground: the butterfly has only four legs adapted for walking; it has abruptly knobbed antennæ, rounded wings, and a feeble flight. There are six British genera—*Melanagria, Erebia, Pyrarga, Satyrus, Epinephele,* and *Cœnonympha.*

20.—Marbled White (*Melanagria Galathea*).

20. Marbled White.—The hind margin of all the wings is scalloped but not angled: the colours are black and white in about equal proportions, and distributed in spots as shown in the figure; the costal margin of the fore wings is densely sprinkled with fulvous gold in the female. The under side is white, slightly suffused with ochreous gray, especially on the hind wings; the fore wings have various blotches of smoky black, as shown in the figure, and a white-pupilled black spot about equidistant from the tip, the costal margin, and the hind margin: the hind wings have various markings of smoky green-gray, with six eye-like spots forming a band parallel with the hind margin; this band is interrupted after the second spot counting from the costal margin; this interruption causes the wing to look as though there had originally been seven spots and the third had dropped out.

Varieties.—The species is not subject to variation, but some remarkable varieties have occurred. Mr. Thomas Marshall, one of our oldest and most assiduous entomologists, mentions one such at page 471 of the second volume of the "Zoologist." He says:—"At the latter end of last July I captured a very remarkable specimen of *Melanagria Galathea* in a field on the heights between Dover and Walmer. The specimen is a male of a clear milky-white colour, and has not either on the upper or under side of the wings the smallest speck of black. Its thorax, body, and palpi are also entirely clothed with white. This specimen is in perfect condition."

Life History.—The parent female does not select any particular species of grass or herbage on which to deposit her egg, but settles indiscriminately on any leaf or stalk that may be nearest at hand, and drops her eggs at random, careless what species of grass may happen to receive it: only one egg is extruded at a time, and when this is disposed of, the female flies a few inches or a few feet and repeats the operation. Mr. Bignell, to whom I am indebted for this information, watched a number of females thus employed on the 26th of July, 1869. The eggs, extruded one by one, find their way by the simple power of gravitation to the roots of the grass, there to take their chance of hatching and future well-doing. The egg, which is perfectly hard and dry, and free from any glutinous covering, is white and almost spherical, but is slightly flattened at both its poles: the young caterpillar emerges in about three weeks, and, after feeding for a short time, hybernates very early in the autumn, and while yet extremely small: it conceals itself towards the roots of the herbage, and very near the surface of the ground: it feeds again towards the end of April or beginning of May, and attains its full size by the end of the latter month. When full fed it rests on a blade of grass in a nearly straight position, the back slightly raised, and the head slightly bent under; if annoyed it falls to the ground in a curved posture, which can scarcely be called a ring, but lies motionless, feigning death, until the prospect of immediate danger is past, when it slowly resumes its ordinary position, and reascends its food-plant. The head is of nearly the same width as the second segment, and is beset with scabrous points which emit hairs: the body is obese and somewhat fusiform, increasing in size to the fifth segment, thence it gradually diminishes to the anal extremity, which terminates in two parallel points above the anal flap, and directed backwards; the segmental divisions are not strongly marked, and each is divided transversely into sections, which are also obscurely indicated; the sides in the region of the spiracles are slightly, almost imperceptibly, dilated; every part of the body is beset, like the head, with scabrous points and short hairs: those of the head and second segment are slightly arcuate and bending forwards, those of the third segment nearly straight and erect, and those of the remaining segments arcuate and bending backwards. The colour of the head is pale dingy green or pale reddish brown; of the body paler dingy green or wainscot-brown, with a pretty clearly defined narrow mediodorsal darker stripe; the dorsal area on each side of this dark stripe is very pale, and its exterior margin almost white; a narrow sinuous reddish stripe intersects each division of this pale area; the lateral area is pale ferruginous, intersected by a narrow whitish stripe below the spiracles, which are intensely black; in addition to this principal broad lateral stripe or area, there are two other very inconspicuous stripes, the one above, the other below it; all the stripes unite, and terminate in the anal points, which are slightly tinged with pink; the ventral surface, legs, and claspers, are pale ferruginous. On the 14th of June my caterpillars left their food, and, lying at the bottom of the gallipot, underwent pupation two days subsequently, without attaching themselves in any way to the grass or other object; in fact they seemed to make no preparation whatever for the change: the chrysalis is short and obese; the head is rounded and without any appearance of ears; the thorax convex, but neither keeled nor angulated; the ventral surface is very gibbose,

more so than the dorsal; there is a prominent scale at the base of each wing-case, apparently covering the spiracle, and the thirteenth segment is attenuated, depressed, scale-like, and fringed with straight bristles, which appear to indicate the inability to suspend itself. The colour of the chrysalis is pale wainscot-brown, partially transparent; the scale at the base of the wing-cases and the caudal scale being dark brown, almost black; the wing-cases are delicately barred with transverse brown lines, very faint indeed, but slightly darker than the ground colour; the dorsal surface of the body is indistinctly striped with a darker shade.—*Newman.*

Time of Appearance.—The caterpillar through the winter and spring, the chrysalis in June, the butterfly in July.

Localities.—I believe this butterfly to be entirely absent from Ireland, Scotland, and the Isle of Man. From many of the northern counties of England it also appears absent. It is not mentioned in Mr. Wailes' admirable catalogue of the Lepidoptera of Northumberland and Durham, and I have no record of its occurrence in Cumberland, Westmoreland, Lancashire, Cheshire, Derbyshire, Shropshire, Staffordshire, or Lincolnshire; but from Yorkshire I have several records. In the other midland, and in all the southern counties, it occurs not uncommonly, but always in restricted spaces, generally confining itself to a single field or rough pasture. It is very partial to rough ground, and seems to avoid the shelter of woods.

Berkshire. At Burghfield, near Reading—*C. S. Bird.*

Buckinghamshire. Drayton Beauchamp and Claydon—*H. H. Crewe;* at Halton once only—*J. Greene.*

Cambridgeshire. Near Duxford—*F. Bond;* common throughout the county—*Thomas Brown.*

Cornwall. Werrington Park, Launceston, Penheale, Egleskerry—*Geo. C. Bignell.*

Devonshire. Various localities in the county—*J. Hellins;* along the Devon coast from Dartmouth to Babbington—*Geo. C. Bignell;* Plymbridge—*E. James, jun.;* in a limestone quarry at Berry Pomeroy, Buckfastleigh, Exeter, Axminster, Sidmouth—*J. J. Reading.*

Dorsetshire. A single specimen was taken at Glanville's Wootton in 1869 by C. W. Dale: it formerly occurred there in plenty; common at Lulworth, Charmouth, Blandford, and Dorchester—*J. C. Dale.*

Essex. Epping—*Edward Doubleday;* I have taken three or four specimens on the railway banks near Lexden; it has disappeared from Hartley Wood, St. Osyth's, where it was formerly common—*W. H. Harwood;* common at Herne Bay—*H. D. Greville.*

Glamorganshire. Common in the county—*Evan John;* I have occasionally seen it near Ynisygerwn—*J. T. D. Llewelyn.*

Gloucestershire. Common on all the hills about Wootton-under-Edge—*V. R. Perkins;* abundant in many localities—*Joseph Merrin;* Bussage and the neighbourhood, Bacon Tump, Daneway Common, Folly Lane, Sapperton—*M. G. Musgrave;* Common at Guiting—*Joseph Greene;* near Stroud—*Alfred E. Hudd.*

Hampshire. Leigh Wood and Durrance Common—*W. Buckler;* Lyndhurst, New Forest—*F. Bond;* Woolmer Forest—*C. G. Barrett;* there is a locality for this insect near Fordingbridge, in the same meadow in which Artemis occurs—*H. Ramsay Cox;* Parley Heath, Bishopstoke, near Winchester—*J. C. Dale;* Southwick, Witham Hill, near Petersfield—*Henry Monereaff;* Emsworth—*W. H. Draper.*

Herefordshire. Oakley Park, abundant—*F. E. Harman.*

Hertfordshire. Woodcock Hill, near Elstree—*F. Bond.*

Huntingdonshire. Monk's Wood, in profusion—*J. H. White;* near Sawtry—*F. Bond.*

Kent. Folkestone, East Cliff, fields round Dover Castle, plentiful—*G. H. Raynor;* Darenth Wood, in profusion twenty years ago in one particular spot, nearly destitute of trees, in which *Chelonia Plantaginis* also abounded; also in a little chalk-pit at Greenhithe—*E. Newman;* Lees Court Park, Chilham Park, and above Dane Court, Chilham—*H. A. Stowell;* Gravesend—*W. Machin;* very abundant at Herne, also at Margate and

Folkestone — *H. Ramsay Cox;* abundant everywhere on the chalk downs near Folkestone—*W. Oxenden Hammond.*

Middlesex. Kingsbury, and near Edgeware—*F. Bond.*

Monmouthshire. Common near Heullis' Wood—*George Loek.*

Norfolk. Kirby Lane, near Beccles, but confined to a single marsh—*W. M. Crowfoot.*

Northamptonshire. Near Barnwell Wold—*F. Bond;* plentiful in Barnwell and Ashton Wolds in July—*William Bree.*

Nottinghamshire. Common at Kirton, near Tuxford, also at Worsop and Mansfield—*R. E. Brameld;* in one field at Egmanton, near Tuxford, in profusion—*George Gascoyne.*

Somersetshire. Clevedon, Portishead—*F. D. Wheeler;* Bedminster—*A. E. Hudd.*

Suffolk. Beccles—*C. G. Barrett.*

Surrey. Between Busbridge and Highdown's Ball, near Godalming, Hindhead, Mickleham, Headly Lane, in one field only—*E. Newman;* Haslemere—*C. G. Barrett.*

Sussex. Very abundant at the Holmbush, and here and there in other places, but very local—*E. Jenner;* very numerous in Abbot's Wood—*C. V. C. Levett;* near Horsham and near Brighton, in both instances confined to a very small space—*E. Newman;* Lewes—*Stainton's "Manual."*

Warwickshire. In woods near Knowle, but it has not been taken for many years—*Frederick Enock.*

Wight (Isle of). Near Yarmouth—*F. Bond;* Ventnor, Parkhurst, Whiteford Wood, Bembridge—*Alfred Owen;* abundant in rough pastures, but remarkably local—*James Pristo.*

Wiltshire. Great Bedwyn, Savernake Forest, seen near Westlands—*T. A. Preston.*

Worcestershire. Meadows at Himbledon, and near Monk's Wood, but uncommon of late years—*J. E. Fletcher;* a single specimen has been taken at Great Malvern; it occurs plentifully a few miles from Malvern—*W. Edwards.*

Yorkshire. Near York—*Robert Cook;* Scarborough and Sheffield—*Edwin Birchall;* common in Yorkshire—*T. H. Allis;* it used to be found in Melton Wood, near Doncaster, but has been extinct since a field that bordered the wood was ploughed; I do not think it is ever now found near Doncaster—*Alfred Eeroyd.*

21. The Small Ringlet (*Erebia Epiphron*). Upper side.

Under side.

21. The Small Ringlet.—The wings are rounded and of a deep sepia-brown colour, with a broad but indistinct ferruginous transverse band parallel with the hind margin of all the wings; this band is divided into compartments by the wing-rays which are of the sepia-brown ground-colour; in each of the compartments there is usually a circular black spot, and the compartments themselves in the hind wings frequently assume a circular form. The under side is very similar to the upper, but the colours are more suffused, and their boundaries less distinct: in some specimens the rust-colour is suffused over the central disk of the fore wings: in the hind wings the ferruginous spots are very small, and the black pupil in each is reduced to a mere dot.

Varieties.—When Mr. Weaver discovered this insect in Scotland as presently related, I could not satisfy myself that it was identical with the butterfly of the Lake District, but supposed it to be the Papilio Melampus of Esper. Under this mistaken impression I published a detailed description at page 732 of the second volume of the "Zoologist."

There is another form not uncommon on the Continent which had been raised to the rank of a species, but now is universally considered a mere variety; it is distinguished by the presence of white pupils to the black spots on the wing: this variety was described as a species by Knoch, in 1783, under the name of *Epiphron;* and ten years subsequently the form without the white pupils was described by Fabricius under the name of *Cassiope:* again, still later, our own Haworth described the same insect under the name of *Mnemon.* In accordance with the usage of science the earliest name only is retained.

Life History.—Of this very little is known; the only record in my possession is from the pen of Mr. Wailes, at page 200 of the second volume of the "Transactions of the Tyneside Naturalists' Field Club," and is in the following words: "Having this summer (1857) captured *Erebia Epiphron* on the mountains near Sprinkling Tarn, Cumberland, and obtained a few caterpillars from eggs deposited by one of the specimens, which, however, I regret to say, have since all died, both those in my possession and those given to my friends, I may as well place on record a description of them, as the caterpillar was previously entirely unknown: pale green, with numerous darker green longitudinal lines shading into the ground-colour, and with a well-defined white line along each side in the region of the spiracles. The caterpillars fed upon the annual meadow grass (*Poa annua*), and the sheep's fescue grass (*Festuca ovina*), though I suspect that in a state of nature they live on the young leaves of the small mat grass (*Nardus stricta*), or some of the smaller rushes (*Juncus*) which constitute the principal herbage on the mountain sides where the insect is met with."—*Wailes.*

Time of Appearance.—Caterpillar in autumn, and again in spring, doubtless hybernating at the roots of the mountain herbage; butterfly in June and July.

Localities.—A very local species in the British Islands. Mr. Birchall gives a single Irish locality—"Croagh Patrick, near Westport: the locality is about half-way up the mountain on the Westport side, in a grassy hollow, where a little hut is erected for the shelter of the pilgrims. I captured a fine series here in June, 1854." It has not been taken in the Isle of Man.

The first notice of the occurrence of this butterfly in Scotland is from my own pen, and is published at p. 682 of the "Zoologist" for 1844. Eight specimens are recorded as having been taken, but subsequently, at p. 729 of the same volume, I have recorded that a considerable number, a great majority of which were males, were taken in the district of Rannoch, in Perthshire, by Mr. Weaver, who wrote thus respecting them: "I took these butterflies when the sun shone, morning and evening, the first on the 27th of June, and the last on the 27th July. They appeared confined to a spot of level and rather marshy ground about 150 yards in length and 50 yards in breadth; it was grassy, but without heath; and although there was plenty of heath all round the neighbourhood I did not see a single specimen settle on it. The locality is among rocky mountains, some of which attain an altitude of 4000 feet above the sea level; and I think that one locality where I found the butterfly is at least 3000 feet above the sea level. I spent ten days in hunting them, and although I wandered over most of the country for ten or fifteen miles round, I found them nowhere else. The nearest village is Kinloch Rannoch, consisting of a few scattered houses, one of which is a shop for sundries, two are pothouses, and the remainder are principally the residences of shepherds. It has no road to any other place." At p. 166 of the first volume of the "Entomologists' Weekly Intelligencer," Mr. Young, of Paisley, says that in the first week in August, 1856, he took a good number of this species on Ben Lomond. At p. 132 of the seventh volume of the "Entomologists' Weekly Intelligencer," Mr. Bibbs, of Worcester, gives us another Scotch locality:—"The spot where I captured them was on the road-side skirting Loch Vennachar, leading from Callander to the Trossachs, about two miles before I reached that romantic pass. Near the spot I observed

a patch of cotton-grass (*Eriophorum*) about half an acre in extent." Dr. Buchanan White observes of this insect that "it is the only truly alpine species indigenous to Britain. In Scotland it occurs at a considerable elevation on the mountains on both sides of Loch Rannoch, and on the north of Loch Tay." Mr. Birchall has also taken it on Ben Nevis.

In England the range of this butterfly is almost, if not entirely, confined to the Lake District, which term I would apply to the county of Westmoreland, the south of Cumberland, and that isolated portion of Lancashire which is north of Morecambe Bay. At page 409 of the third volume of the "Entomological Magazine," Mr. Heysham, of Carlisle, writes thus:—"On the 4th of July last I found this species in considerable abundance in the vicinity of Sprinkling and Styehead Tarns, at the head of Borrowdale; the female appears to be rare, and the few that I captured were much wasted, although many of the males were still in fine order."—*T. C. Heysham*. Mr. Curtis, however, at p. 205 of his exquisitely beautiful "British Entomology," expresses an opinion the very reverse of Mr. Heysham's; and as he was in company with Mr. Dale, one of the very best and most accurate of all entomological observers, I incline to adopt his view of the matter in preference to Mr. Heysham's. "The males," says Mr. Curtis, "in forward seasons have appeared as early as the 11th of June; but last year, when Mr. Dale and I visited Ambleside, they were later, the first being taken on the 18th of June, and they did not become plentiful until the 25th. They are found among the coarse grass that covers considerable spaces, abounding with springs, on the sides of the mountains; they fly only when the sun shines, and their flight is neither swift nor continued, for they frequently alight amongst the grass, and, falling down to the roots, their sombre colour perfectly conceals them. The females are later, and have been seen even in August. We found the males on Red Skrees, a mountain near Ambleside; and Mr. Marshall took them at Gable Hill and Styehead, between Wastwater and Borrowdale." Mr. R. Bowman Labrey, at p. 171 of the first volume of the "Entomologist," informs us he "took a few specimens on the 23rd June, near the edge of Styehead Tarn, between Borrowdale and Wastdale, in Cumberland. The day being generally cloudy, I only saw them on the wing during a temporary gleam of sunshine." At p. 198 of the sixth volume of the "Entomologists' Weekly Intelligencer," Mr. Crewe says: "On the 30th June, while ascending Helvellyn, I observed this species flying about in plenty, about three parts up the mountain, over some boggy patches of ground. To these spots it appeared confined, for higher or lower not a single specimen was to be seen: they were getting rather worn." Mr. J. B. Hodgkinson informs me he took *Epiphron* at Langdale Pikes, rather to the west side, at the end of June.

22. Northern Brown (*Erebia Medea*). Upper side.

Under side.

22. Northern Brown.—The hind margin of the wings is rounded and scarcely at all scalloped; the colour is a rich velvety sepia-brown, each wing having a broad but not very clearly defined rust-coloured band parallel with the hind margin; in this band there are usually four circular black spots in the fore wings and three in the hind wings; the first and second of those in the fore wings are always united, and each has a pupil of snowy whiteness; the third spot is smaller and less constant; its white pupil is very small if present,

but is sometimes entirely absent; the fourth is larger and almost invariably distinct: the rust-coloured band of the hind wings is divided into compartments by the wing-rays, which are of the dark ground-colour; each of the three principal compartments contains a circular, small, and ill-defined round black spot, with a white pupil. The under side of the fore wings is dark brown, with a broad fulvous band parallel with the hind margin; in this band are the same ocellated black spots as on the upper side: the hind wings are blue gray or fulvous gray, with two broad transverse bands of a darker tint; the first of these is median, the second marginal; in the area between these bands are two, three, or four minute white spots, each with a dark circumscription.

Obs.—It would, perhaps, be more precise to describe the under side of the hind wings as divided transversely into four compartments, of which all except the basal compartment are in the form of bands; the third compartment is always lighter than the second and fourth, but is not always of the same colour; it is sometimes fulvous brown, and sometimes blueish ash-coloured; the first or basal compartment of the wing generally corresponds in colour exactly with the third; but this is not always the case, for in several specimens in my collection the first compartment is perfectly concolorous with the second. The different tinting of these compartments has induced entomologists to establish numerous varieties, but the propriety of this course seems to me rather questionable. On this subject Mr. Wailes has remarked, at page 41 of the first volume of the "Entomological Magazine," "that the males never have the broad brown band underneath the hind wings instead of the bluish ash one, whilst the females may be considered as divided into two great varieties equally common, distinguishable not only by the colour of that band, but by the greater distinctness of the ocelli." Accepting this view, it would appear that the normal colour of the third compartment in the male is blueish ash, but that a variety of the female frequently occurs in which it is fulvous brown.

Obs. 2.—It seems desirable to notice the change of a familiar name: the Blandina of Fabricius, published in 1794, is the same as the Medea of the Vienna Catalogue, published in 1776: Mr. Doubleday has pointed out this fact, and we have no choice but to revert to the older name.

Life History.—At page 199 of the third volume of the "Transactions of the Tyneside Naturalists' Field Club," Mr. Wailes first announced the discovery of the eggs and caterpillars of this species. The eggs he does not describe, but Mr. Buckler has supplied this omission at page 65 of No. 75 of the "Entomologists' Monthly Magazine": Mr. Buckler says "The egg may be called large for the size of the fly, and is nearly globular, though somewhat ovate in shape, and placed on end; the shell is glistening and ribbed, but not deeply, with about thirty longitudinal ribs, and with very shallow transverse reticulations, in colour pale greenish-yellow, afterwards pale pinkish-gray, speckled with claret-brown." To proceed with Mr. Wailes' discovery, that gentleman says, "I have succeeded in obtaining a few eggs, which hatched about fourteen days after they were laid, and the young caterpillars fed freely on several species of meadow grass (*Poa*) in October, when they ceased feeding preparatory to hybernation; they had undergone their second moult, and were then pale green, with a dark green or brownish stripe down the back, and two white ones narrowly bordered by the same dark colour on each side. In the lower white stripe on each side are the spiracles: the posterior extremity is attenuated and slightly furcate, as in other caterpillars of the family."

I am able to add the description of a caterpillar when full fed, which was on the 1st of July, 1870: it rested in a nearly straight position on the stalks or leaves of the brown bent grass (*Agrostis canina*), and it fed in confinement exclusively on the latter, but I cannot say whether this is the case in a state of nature: these leaves appear to possess a revolute margin, and hence to assume a somewhat tubular character: when annoyed the caterpillar seemed to grasp more tightly with

its anal claspers, and when compelled to relinquish its hold, it fell among the grass and assumed a somewhat crescentic form, the two extremities approaching, and in this position it remained a while perfectly motionless; after sufficient time had elapsed for the disappearance of the supposed enemy, it began to crawl, but all its movements were remarkably sedate, or even lethargic. The head is rather narrower than the second segment, into which it is partially received; it is scarcely at all divided on the crown, has a slightly convex face, and a rough surface resembling shagreen, and composed of approximate warts, each of which emits a hair from its summit: the body is obese, decidedly thickest in the middle, and diminishing towards both extremities; the division into segments is not very manifest, and is rather concealed by a division of each segment into four sections, each of which seems composed of a transverse series of warts; thus the eye is attracted by the minor divisions, and the major divisions, or segments, properly so called, may readily escape notice; the body terminates in two short and blunt processes directed backwards; the legs and claspers form two approximate series under the belly, and are not perceptible from above, whether the caterpillar is at rest or in motion. The general colour of both the head and body is wainscot-brown; the ocelli are black, and one on each side is unusually prominent, appearing almost pedunculate; the body has a narrow medio-dorsal stripe almost black, and the colour on each side of this is paler than the general ground colour, thus rendering the medio-dorsal stripe more conspicuous; the spiracles are intensely black; half way between the spiracles and the medio-dorsal stripe is a side stripe, paler than the general ground colour, but bordered, especially below, by a darker margin, which is broken up into elongate spots, but these are rather vague, and not very noticeable; the legs, claspers, and under surface are nearly of the same tint as the dorsal surface; the warts are of a very pale hue, almost white, each having in the centre a small black hair. It was full fed at midsummer.—*Newman.*

I am indebted to Mrs. Hutchinson, of Grantsfield, near Leominster, for the opportunity of describing this interesting caterpillar, which, however, I only saw in that lady's possession. Mr. Buckler has been fortunate in obtaining an interview with the chrysalis also. His caterpillar assumed this state on the 22nd of June. It was not attached by the tail in the usual fashion of the *Satyridæ*, but was placed in an upright position amongst the grass, near the ground. "The CHRYSALIS," says Mr. Buckler, "is nearly five-eighths of an inch in length, the wing-cases long, the body plump, thickest in the middle, tapering to the tail, and ending in a blunt flat spike; the back of the thorax is rounded, the head and eye-pieces prominent. At first the head, thorax, and wing-covers were semi-transparent and of a pinkish-gray tint, the body ochreous, with dark dorsal stripe, and other lines and spiracles also as in the caterpillar; but by the 10th of July the eyes became black; the thorax, antenna-cases, and wing-covers, after passing through an opaque cream-coloured stage, finally changed to a dingy dark pinkish brown. The butterfly, a very fine male, came forth on the 15th July."—*Buckler.*

TIME OF APPEARANCE.—The young caterpillar is to be found in September and October, the full-grown caterpillar at the end of June, when it changes to a chrysalis, and the butterfly is on the wing in July and August.

LOCALITIES.—I am not aware of this species having been found in Ireland or the Isle of Man. In Scotland it is common. Mr. Douglas took it in the pass of Killikrankie in 1832. At page 167 of the second volume of the "Entomologists' Weekly Intelligencer," Mr. T. Chapman, of Glasgow, informs us that this species was in plenty in rushy flats during the second week in August, 1857, extending for twelve miles along the east side of Loch Long. And at page 171 of the same volume, Mr. Jazdowski writes:—"I have been spending the last few days at Braemar, and on one of the hills near the village I found *Erebia Medea* in great numbers. The hill was almost entirely covered with birch and pine trees, and the insect occurred in an open space near the top of the hill. The ground here was

covered with coarse grass, heather, and ferns: the insect was flitting about chiefly among the ferns, and was so numerous that in two excursions I caught upwards of three dozen." And, again, Mr. Somerville, at page 181 of the fourth volume of the same journal, writes, on the 25th of August, 1858:—"During the past few weeks I have taken a number of fine specimens of this insect on the borders of Dumfriesshire." Mr. Birchall informs me he finds it in the Highlands generally. Dr. Buchanan White says it "occurs abundantly in some of the Highland valleys of Perthshire, as at Pitlochrie, Rannoch, &c., but is rather local. This species does not range so far up the mountains as *Cœnonympha Davus*, for, from some observations made last summer in Inverness-shire, it appears that *Erebia Medea* was scarcely seen above eight hundred feet, while *Cœnonympha Davus* attained an elevation of upwards of two thousand feet; the two species being found together from two hundred feet up to eight hundred feet above the sea level. Both species are, I believe, found at the sea level." Dr. White took *Medea* on the 30th July in 1867, and on the 21st July in 1869. Writing of Strathglass, in Inverness-shire, Dr. White adds:—"The most universally distributed butterfly was *Erebia Medea*, which absolutely swarmed in all the open marshy places in the woods, sometimes even coming into the gardens."—*Entomologists' Monthly Magazine*, No. 74, p. 47.

In England I have but few localities to record.

Durham. "This, the most interesting of our local butterflies, was first met with in England by the late Mr. William Backhouse, in Castle Eden Dene, about thirty-five years ago. In 1829 I find he had the pleasure of capturing it in the above locality, where it abounds in the early part of August in the more open grassy places of the Dene. I may here mention that Castle Eden Dene is the largest and most beautiful of a series of romantic dells, or denes, which consist, as it were, of immense clefts or chasms in that part of the secondary series of rocks termed the magnesian limestone. These denes are, for the most part, narrow and confined, and so densely covered with wood as to render them too close for the active pursuit of the entomologist: but as the chasms approach the sea-coast, where they all terminate, the banks lose their very precipitous appearance and expand into valleys. Small brooks, locally termed *burns*, run through them, but from the porous nature of the limestone the waters seldom reach the sea; and in Castle Eden Dene, where the stream is larger, and fed by two or three small rivulets, at the distance of, perhaps, a mile apart, the supply poured down by one disappears, and in one place very suddenly, ere it reaches that part of the main watercourse where the next empties itself. In winter, however, the melting of the snow and heavy rains apparently convert the dry bed into a torrent; and, judging from the width of the channel, a large body of water must rush down the valley. Castle Eden Dene is about four miles long, and averaging nearly a quarter of a mile in width, though in some places the rocks, often a hundred feet perpendicular, reduce its breadth to half that distance. Vegetation is most luxuriant, and its botanical treasures have long rendered it famous in the works on that part of natural history. Suffice it to say, the rare Lady's Slipper (*Cypripedium Calceolus*) is here, and almost here only, to be met with. Towards the sea the banks have a more barren appearance, and assume the peculiar marks of the tract of rocks to which the district belongs, producing a great variety of the grasses and other plants delighting in an arid and poor soil. Here the juniper and privet are, by the force of the winds, thrown into those curious flat growths which must have struck every one who has seen the trees and bushes growing on an exposed sea-coast. The banks of the Dene are generally moist, consequent on the density of the foliage and numerous springs in the limestone: but here and there dry exposed grassy spots occur; and on the principal of these, nearly opposite the mansion of the proprietor—Mr. Rowland Burdon—the beautiful *Erebia Medea* is to be found in abundance. I have been thus diffuse in

describing the place because I am persuaded that the connexion between entomology, geology, and botany—especially the two former—has not been sufficiently attended to; and, from my own short experience, I think a pretty good idea may be formed of the insects likely to be found in any district if its geological features are taken into careful consideration"—*George Wailes* in "Entomological Magazine," vol. i., p. 61. When at Castle Eden Dene, in 1841, this insect was very abundant. I found them settling on the blossoms of the marjoram (*Origanum vulgare*). There is no heath in the neighbourhood, and I think this may account for the Castle Eden Dene specimens differing from the Scotch ones—*J. C. Dale* in "Entomologist," vol. i., p. 191. Still plentiful at Castle Eden Dene in 1869—*William Maling*.

Cumberland. I have only seen one specimen taken at Coldbeck, Sebergham—*J. B. Hodgkinson*.

Lancashire. Abundant in the county at Grange, Arnside, and Silverdale—*J. B. Hodgkinson*.

Westmoreland. Abundant at Witherslack—*J. B. Hodgkinson*.

Yorkshire. Colne—*Edwin Birchall;* Common at Grassington, above Settle—*T. H. Allis*.

23.—Speckled Wood (*Pyrarga Egeria*).

23. Speckled Wood. — The wings are rounded, but the hind margin of all the wings, more particularly of the hind wings, is scalloped: the colour is smoky brown, the fore wings having eight or nine differently shaped pale brown spots, the position of which will be more clearly understood by a reference to the figure than from any definition of mine; the largest of these spots is situated near the tip, and is divided into three compartments by the wing-rays, which are dark; the middle compartment encloses a nearly circular black spot which has a snow-white pupil: the hind wings have six or seven pale spots, the four largest of which constitute a band parallel with the hind margin; three of these generally contain a black spot with a white pupil; the middle spot of these three is the largest and most distinct; and the fourth, that nearest the apical angle, is almost invariably without the white-pupilled spot. The under side of the fore wings very much resembles the upper side, but that of the hind wings is suffused, clouded, and marbled with different shades of fulvous brown, the ocellated spots of the upper side being discernible but very indistinct. The eyes of this species are hairy.

Obs.—The character of hairy eyes is common to this and the following species: they are very properly associated as the genus *Pyrarga* on account of this peculiarity.

Life History.—The eggs are laid singly on the stalks or leaves of several species of grass, and are almost spherical in figure, the entire surface being reticulated with minute ridges, which divide it into hexagonal cells, and give it the appearance of being honeycombed: the young caterpillars emerge in eight or ten days, and feed on the leaves of grasses: at first they are of a dingy brown colour, except the head, which is black, and exhibit but little indication of stripes; after the first moult they lose their black heads and assume green ones; they hybernate early, and are full fed by the end of the following March, when they rest in a perfectly straight position on a blade of grass. The head is subglobose, wider than the second segment, and scabrous, the raised points which cause the scabrosity emitting small but rigid bristles: the body is slightly shuttle-shaped, the attenuation being more manifest towards the anal extremity; the incisions of the segments are deeply and conspicuously marked; the segments are again transversely wrinkled or divided into narrow sections; the entire surface is slightly scabrous, and

covered with very minute but stiff bristles; the anal extremity is produced into two parallel points directed backwards. The colour of the head and body is either dull olive green or dull pale umber brown; in either case the body has three compound or triple stripes; one of these is dorsal, and is composed of a medio-dorsal dark smoke-coloured stripe, and two yellowish or whitish marginal stripes, the dark medio-dorsal stripe being in some specimens again divided by a very narrow and indistinct white stripe; this median compound stripe terminates with the twelfth segment; the other compound stripes are lateral, composed of the same colours, and terminating in the anal points. Early in April the caterpillar spins a slight silken covering on a stalk, stem, or blade of grass, and, suspending itself therefrom by the anal claspers, is changed to an obese CHRYSALIS, with the head broadly notched; the thorax, wing-cases, and body are gibbose, and suspended in an oblique position by numerous small hooks at the anal extremity: the skin of the caterpillar always remains attached to the anal extremity, even after the butterfly has escaped: the colour of the chrysalis is dingy green or brown, the antenna-cases are barred, and the wing-cases streaked with dark brown or black; the back is also freckled with black, and has four or six white dots.—*Newman.*

Obs.—Sepp observed the young caterpillars to moult five times before hybernating, namely, on the 11th of August, when eight days old; on the 18th and 27th of the same month; and on the 4th and 15th of September; and that they ate their own skins.

TIME OF APPEARANCE.—The caterpillar may be found hybernating throughout the winter, and full fed at the end of March; the chrysalis at the beginning of April; and the butterfly from the 10th to the 20th of the same month.

Obs.—The opinion appears universally to prevail that this species is double-brooded, and in this (reasoning from analogy) I feel inclined to concur, although I have never seen an æstival brood of caterpillars, nor is such mentioned by Sepp; but Lewin says this species "goes through its different changes exceedingly quick, so that there are not less than three distinct broods in the year;" and Mr. Doubleday informs me that this is in exact accordance with his own observations.

LOCALITIES.—I believe the Speckled Wood to be distributed more or less abundantly in every part of the United Kingdom, with the exception of the Isle of Man and the north of Scotland. Mr. Birchall says it is generally abundant throughout Ireland; Dr. Buchanan White informs us it is "a very local species in Perthshire, and never appears to be abundant. It occurs on Kinnoull Hill and near Muirhall, and is double-brooded. In Scotland it has not been recorded beyond the north of Argyleshire." Dr. White gives the following dates of its occurrence:—"1858, May 6; 1859, July 8; 1860, May 1; 1869, April 26 and August 8." I believe it occurs in every English and Welsh county. Mr. Jenner-Fust omits it from his seventeenth and eighteenth provinces, comprising Wales: in both these so-called provinces I know it to be very plentiful.

24.—The Wall (*Pyrarga Megæra*). Upper side of Male and Female.

24. THE WALL.—The wings are rounded, and the hind margin of the hind wings is slightly scalloped; the colour of all the wings

is tawny fulvous, transversely barred with smoky brown, the distribution of which colour differs greatly in the sexes; in both sexes there is a large and conspicuous circular black spot near the apical angle of the fore wings; this has invariably a snow-white pupil; the hind wings have a series of three nearly

Under side of Female.

circular black spots parallel with the hind margin, and two of these—those nearest the anal angle—are always white-pupilled. The under side is beautifully mottled and marbled with different shades of fulvous brown; nearly parallel with the hind margin is a series of six small circular white-pupilled black spots, each of which is surrounded with four rings, the first and third of which are fulvous, the second and fourth dark brown. The male differs from the female in being smaller, and in having a broad, oblique, dark brown band extending from the middle of the fore wing to the middle of its inner margin. The eyes are hairy.

Life History.—This species is double-brooded: the eggs which produce the first brood of caterpillars are laid on the cock's foot grass (*Dactylis glomerata*) and several other species of grass at the end of May; the caterpillar is full fed about the middle of July, when it rests by day in a nearly straight position on a blade of grass, feeding chiefly by night. The head is subglobose, exserted, and wider than the second segment, which is restricted in front. The body is somewhat fusiform, gradually decreasing to each extremity; it is decidedly convex above, and somewhat flattened beneath; the dorsal surface is transversely wrinkled, the wrinkles dividing each segment into six sections, of which the anterior is the largest; the body terminates in two parallel points directed backwards; the entire surface, both of head and body, is covered with minute warts, which impart a scabrous appearance to the caterpillar; each wart emits a short bristle; on each side below the spiracles is a decided but inconspicuous skinfold. The colour is apple-green, the head and an indistinct narrow medio-dorsal stripe being rather darker; the latter appears to be little more than the food in the alimentary canal showing through the cuticle; it is sometimes entirely absent; there is a lateral stripe of a rather paler colour, and also a narrow and very indistinct stripe exactly intermediate between the medio-dorsal and lateral stripes; the minute warts are generally, but not invariably, white; the bristles either black or white; the legs are semitransparent and almost colourless; the claspers are concolorous with the body, and the anal points are tipped with pink. My specimens changed to chrysalids, suspended by the tail, on the 14th of July; the chrysalis is rather obese; the head is broad and rather square, but slightly notched or excavated in the middle, the angles being almost right angles; the thorax dorsally humped and keeled, laterally angled at the base of the wing-cases; the dorsal surface of the body has a lateral series of six points on each side. The colour is apple-green; the angles of the head, the lateral and dorsal angles of the thorax, and five equidistant raised dots on each side of the dorsal surface of the body, are white, tinged with yellow.—*Newman.*

Time of Appearance.—The caterpillar may be found hybernating throughout the winter, the chrysalis in April, and the butterfly in May: the second brood of caterpillars occur in June, the chrysalids in July, and the butterflies in August.

Localities.—Mr. Birchall informs us that this butterfly is generally abundant throughout Ireland; it also appears in the Manx list, which he has kindly sent me. Dr. Buchanan White says "it was formerly common near Perth; he has heard of no specimen being taken since 1860, in which year it was common. The series of cold summers following that year seem to have destroyed the species; though

possibly, like *Pyrameis Cardui*, it may again put in an appearance. It is found in Scotland as far north as Argyle." It is a common butterfly in all parts of England and Wales.

25.—The Grayling (*Satyrus Semele*). Upper side of Male.

Upper side of Female.

Under side of Male.

Under side of Female.

25. The Grayling.—The fore wings are blunt at the tip, the hind wings have the hind margin scalloped; their colour is dull brown, with an irregular wainscot-brown band occupying nearly the outer half of the wing; in the fore wings this band is almost interrupted in the middle, and each of the divisions has a large and almost circular white-pupilled black spot; the hind wings have but one smaller white-pupilled black spot. The under side has the disk of the fore wings fulvous, inclining to ferruginous at the base, the outer or fulvous portion having two very distinct circular white-pupilled black spots; the hind wings are mottled and marbled with various tints of gray and brown, the basal portion being darker, and the darker portion bearing a very obvious similarity to the familiar profile of the late Lord Brougham. Such is a description of the female; the male, more especially on the upper side, is suffused with brown, and the markings I have described are very indistinct.

Varieties.—This insect is not subject to much variation, properly so called; but Mr. Bond possesses some extraordinary abnormities, the peculiarity of which consists in the presence of the colouring of both sexes in a single individual. Perhaps a little amplification may render this kind of abnormity somewhat more intelligible. Let us call four specimens of *Semele* Nos. 1, 2, 3, and 4, and the four wings of each A, B, C, and D; then in No. 1 the wings A and C will be male wings, and the wings B and D will be female wings; in No. 2, B will be a male wing and A, C, and D female wings. Mr. Bond has some very extraordinary examples of this phenomenon, and exhibited them at a late meeting of the Entomological Society, as reported at p. 2070 of the second series of the "Zoologist." With his customary kindness and zeal for the advancement of science, Mr. Bond has offered me all these specimens to illustrate this work; but I could not accept them, having already declined innumerable offers of hemigynous, or, as they are incorrectly termed, "hermaphrodite" specimens of butterflies, more especially among the *Lycænidæ*.

Life History.—Three valuable accounts

of the preparatory states of this insect have been written by as many excellent entomologists. Sepp, the inimitable Dutch artist, was the first; Mr. Logan, of Edinburgh, the second; and Mr. Buckler, of Emsworth, the third. Mr. Buckler's description is published in the "Entomologists' Monthly Magazine" for January, 1866, and is reprinted in the "Zoologist" for August of the same year. It seems, however, that Mr. Buckler was indebted to the Rev. John Hellins, of Exeter, for the details. Mr. Hellins received the EGGS on the 26th of July and 3rd of August, 1864. Some of them hatched on the 8th of August, and the young CATERPILLARS continued coming out for three or four days. At first they were fed on that most objectionable of all grasses known as creeping wheat grass, couch grass, squitch or spear grass (*Triticum repens*). They were of an ochreous colour, with a black interrupted medio-dorsal stripe; they were very sluggish, often hiding low down, and hybernating when about four lines in length. One caterpillar only survived the winter, and this was presented to Mr. Buckler on the 13th of May. "The caterpillar," says Mr. Buckler, "had shown a partiality for the turfy hair grass (*Aira cæspitosa*) previous to my receiving it, and on this it was therefore placed, being then about eight lines in length. On the 20th of May I chanced to dig up a rather larger caterpillar of this species from a waste piece of sandy ground near the sea, amongst early hair grass (*Aira præcox*) and other small grasses, which rendered the task of rearing doubly interesting, in observing the habits of each, kept separate and on different food. The captured caterpillar, on being placed under a glass in a pot with its native growing food, immediately burrowed in the sandy earth, and the few times it was seen on the grass was always at night, and each morning brought evidence of its doing well by the diminished grass. About the 14th of June these indications ceased, and on the 23rd I searched for the CHRYSALIS, and found it in a hollow space a quarter of an inch below the surface, the particles of sand and earth very slightly cohering together, and close to the roots of grass yet free from them. The chrysalis was obtuse, rounded, tumid, and smooth, the abdominal rings scarcely visible, and wholly of a deep red mahogany colour. The perfect insect, a male, appeared July 24th. The caterpillar, reared wholly in captivity from the egg, always remained on its rigid food, with its head uppermost, when feeding, which at first it did day and night till it was an inch long, from which time it fed only at night, remaining all day at rest on the grass, with its head downwards, in comparative darkness, amongst the lower parts of the stems. It never showed any disposition to burrow, though the soil was supplied for the purpose, until it was full fed, about the middle of June. The butterfly, a male, appeared on the 5th of August. No material difference existed between the two caterpillars, excepting that the captured one was rather less bright and distinct in colour and markings than the other. The full-grown caterpillar is an inch and a half in length, tapering much to the anal forked extremity and a little towards the head, which is globular. The ground colour of the back is a delicately mottled drab, with longitudinal stripes, broadest along the middle segments, viz., a dorsal stripe of olive-brown, very dark at the beginning of each segment, with a thin edging of brownish white. Three stripes along the subdorsal region, of which the first is composed of a double narrow line of yellowish brown, the second wider, of the mottled ground colour, edged above with paler and below with white, and the third of a similar width of dark gray-brown, edged above with black; the spiracular stripe is broader and of nearly equal width, of pale ochreous-brown, edged both above and below with brownish white. The spiracles are black, the belly and legs drab colour. The head is brown, on which the principal stripes of the body are delicately marked with darker brown."—*Buckler.*

TIME OF APPEARANCE.—Caterpillar in autumn, winter, and spring (after hybernation); chrysalis in June, and the butterfly in June and July.

LOCALITIES. — Common in stony, rocky,

heathy, uncultivated places, and on elevated poor pastures; often concealing itself on the ground, and flying only when disturbed, and then for a short distance. I never saw it settling on flowers or basking in sunshine: Mr. Doubleday, however, says he saw scores on the wing together in the Island of Sark, on the side of a rock upon which the sun shone early in the morning. Mr. Birchall says it is generally abundant throughout Ireland, and that he took it at Douglas in the Isle of Man. Dr. Buchanan White says that "although rather local in Perthshire, it is an abundant species where it does occur. Its favourite haunts are warm rocks, such as Kinnoull and Moncrieffe hills, and in such situations it is very common. In Scotland it occurs as far north as Sutherland, but does not seem to be found in the alpine parts of the country. Scottish specimens are slightly larger and darker than English ones." Dr. White gives the following dates of capture: — "1858, June 21; 1860, July 16; 1864, June 25; 1865, July 1." In England it occurs in nearly all our counties, and often abundantly.

26.—Meadow Brown (*Epinephele Janira*). Upper side of Male.

Upper side of Female.

26. Meadow Brown. — The tips of the wings are blunt, and the hind margin of the hind wings is decidedly scalloped, that of the fore wings indistinctly so; the colour of the fore wings is smoky brown, with a large transverse blotch, almost amounting to the central area, inclining to rusty brown, or in some specimens to wainscot brown; within this paler blotch is a large circular white-pupilled black spot; the hind wings are almost uniform smoky brown, with a slightly paler

Under side of Female.

transverse median mark. Such is a description of the upper side of the female; the male is very much darker, and nearly uniform umber-brown; the pale blotch and black spot are to be traced, but are very indistinct. The under side is paler; the basal half of the fore wings is deep fulvous, followed by a pale fulvous band, in which is a large circular white-pupilled black spot; the hind margin is umber-brown; the hind wings are brown; the basal and hind-marginal area are darker; a transverse band across the middle is paler: the outer margin of this pale band is not clearly defined.

Variety of Male in Mr. Bond's collection.

Varieties.—This species is exceedingly subject to variation in one particular manner, namely, in the presence of large blotches or sometimes of an entire wing, having the

appearance of being bleached, the usual brown colour being absent in such blotches, and a kind of dingy white appearing in its place;

Variety of Female in Mr. Clark's collection.

two of these curious aberrations are figured. The female also occasionally appears with all the coloration of the male. Mr. Dale first called my attention to this peculiarity, and forwarded me a specimen; since which I have captured several.

Obs.—The male is the *Papilio Janira* of Linnæus; the female is that author's *Papilio Jurtina*.

Life History.—The females deposit their eggs on various species of grasses, and, from the willingness exhibited by the caterpillars in confinement to eat any grasses provided for them, I conclude that little choice is displayed in the selection of species: the period of oviposition extends over seven or eight weeks, commencing about the third week in June, and ending about the middle of August, during the whole of which period I have observed the females busily engaged in this occupation. The young caterpillar emerges in twelve days, and feeds sparingly, after the manner of infant caterpillars, until the first moult; as soon as this is accomplished it retires towards the surface of the ground, and hybernates at the roots of the herbage. In May it reappears, and may then be found by examining the mowing grass near the surface of the ground. It is usually full fed by the beginning of June, and then rests in a tolerably straight position, generally towards the base of a blade of grass, but when disturbed falls from its food-plant, and rolls itself in a tight, but not very compact, ring, the anal extremity protruding in rather a marked manner over the head: in this attitude it will remain for hours perfectly motionless. The head is rather broader than the second segment, and its position prone: the body is obese, somewhat spindle-shaped, tapering from the sixth to the thirteenth segment, which terminates in two parallel points above the anal aperture and directed backwards; the surface of the skin is rough, almost like shagreen, the roughness being caused by minute warts; the segmental divisions are not well marked, except when the caterpillar is rolled up; each segment is transversely divided into sections, which are also obscurely indicated; the sides are slightly dilated; the surface throughout is pretty thickly covered with arched hairs directed backwards. The colour of the head and body is opaque apple-green, with a mediodorsal darker stripe, indicating the position of the alimentary canal, and probably partially due to the presence of food therein: the lateral dilatation is surmounted with a narrow pale stripe, almost white; the anal points are dirty white, tinged with brown: the hairs are white. Three of my specimens changed to chrysalids on the 18th, 24th and 29th of May respectively: the head of the chrysalis is obtusely eared, the ears very distant and short; the thorax is dorsally keeled, the keel being slender and entire; the shoulders of the wing-cases are produced into an obtuse tooth: in two instances the skin of the caterpillar remained, enveloping the anal extremity, so that the chrysalis could not be suspended; in the third it hung for a time from a blade of grass, the skin still enveloping the anal extremity, but attached by its anal hooks to silken threads on the grass. The colour of the chrysalis is pale apple-green, freckled with whitish or yellowish green, and adorned with purple-black markings, of which the more conspicuous are—first, two dorsal series, commencing behind the head, passing on each side of the thoracic keel, broken into spots on the fourth, seventh, eighth and ninth segments, and continuous on the remainder; secondly, a series passing over the ears, and

occupying the dorsal margin of the wing-cases; thirdly, an angulated longitudinal stripe on the wing-cases, dividing them into two nearly equal parts; fourthly, a shorter stripe nearer the tip of the wing-cases; and fifthly, the cases of the fore and middle legs. —*Newman.*

Time of Appearance.—The caterpillar lives throughout the autumn, winter, and spring; the butterfly is on the wing during the hay harvest.

Localities.—This is perhaps the most generally abundant of all our butterflies, frequenting every meadow when the grass is ready for cutting. Mr. Birchall says it is generally abundant throughout Ireland, and that it occurs in the Isle of Man. Dr. Buchanan White says it is a common species in Scotland, although it was rare in the Rannoch district in 1867. Its range does not extend high up the mountains. It swarms in most parts of Wales, and I have seen no English district in which it does not abound.

27.—The Large Heath (*Epinephele Tithonus*). Upper side of Male.

Upper side of Female and Under side of Male.

27. The Large Heath.—The hind margin of the hind wings is scalloped, that of the fore wings is simple; the colour of the fore wings on the upper side is bright rust-colour, approaching to fulvous, with a broad hind-marginal band of umber-brown; the costal margin is also suffused with brown; near the apical angle of the median rust-coloured area is a conspicuous circular black spot with two white pupils; the hind wings are umber-brown, with a restricted rust-coloured patch in the centre. The under side of the fore wings is reddish fulvous, with a broad brown hind-marginal border; the hind wings are marbled with gray-brown, the basal area and a portion of the hind-marginal area being darker; the intervening space is paler or grayish brown, and tinged with ochreous; it contains four darker spots, each of which has a white pupil. Such is a description of the female; the male differs on the upper side in having a transverse brown band originating rather above the middle of the wing, and descending obliquely to the middle of the hind margin.

Varieties.—Some few specimens have on the upper side one or two additional smaller black spots near the hind margin of the fore wings; these are very rarely white-pupilled.

Life History.—The eggs are laid during July on the blades of grass, and may be described as truncated cones; they stand erect, the base being broader than the apex; they have sixteen, seventeen, or eighteen perpendicular ribs, and a great number of extremely delicate transverse striæ, only visible under a lens of high power; their colour at first is canary-yellow, but in a few days they acquire a browner hue, and before the emergence of the caterpillar they exhibit a darker median band. The young caterpillars emerge during August, generally between the 5th and 25th of the month, and at first eat very little and grow very slowly; they moult twice before the winter, and hybernate at the roots of grasses while still very small; in May they reascend the grass and feed voraciously, and are full grown by midsummer. The caterpillar, when full grown, rests in a perfectly straight position on a blade or stalk of

the food-plant, which is the common couch grass (*Tritieum repens*), a favourite food of the genus; but when annoyed it falls to the ground, assuming a crescentic postnre; the head is snbglobose, exserted, manifestly wider than the second segment, thickly covered with scabrous points, each of which emits a minute bristle; the body is somewhat shuttle-shaped, the diminution towards the head being rather less than towards the anal extremity; the divisions of the segments are clearly defined, and each segment is transversely wrinkled or divided into sections, which are usually, but not invariably, six in number; each of these sections is beset with scabrous points, and each point emits a short and slender but stiff bristle; the thirteenth segment terminates in two scabrous conical points parallel to each other, and directed backwards; the colour of the head is pale pinkish brown; of the body either glaucous green or olive green, or, in some specimens, pale dingy brown; in either case it has five nearly equidistant longitndinal stripes; a narrow and dark medio-dorsal stripe extends from behind the head to the sinus between the caudal points; on each side, halfway between this and the spiracles, is a pale stripe, bordered above with a dark ground colour, which makes it appear more conspicuous; and below this, on a line with the spiracles, is a more distinct and whiter stripe; this also is bordered above with a dark ground colour; the feet and claspers are concolorous with the body. When about to change the caterpillar attaches itself by the anal claspers to a blade of grass, and in two days is transformed into a CHRYSALIS, suspended by minnte anal hooks from a delicate silken carpeting, with which the caterpillar had previously and designedly covered a small space on the grass. The chrysalis is short and obese; its head is dilated, and flattened in front, the flattened portion being produced on the sides into obtuse ears, with a slightly hollowed space between them; the thorax has a sharp medio-dorsal keel; the body is dorsally somewhat verrucose, having four longitudinal dorsal series of extremely depressed and scarcely perceptible warts; the colour is almost white, sometimes slightly tinged with green, and ornamented with numerous black markings, of which the undermentioned are the most conspicuous: a narrow dorsal line on the thorax, divided just behind the head, and again united; two dorsal stripes commencing very near the back of the head, passing on each side of the thoracic dorsal line, then dilating and broken up into subquadrate and rather paler blotches; on each side exterior to these is another somewhat similar marking, commencing on the thorax as a stripe, but interrupted and vague towards the anal extremity; and again, exterior to this is a broad black linear patch adjoining the wing-cases; the wing-cases are dashed with black longitndinally; the cases of the antennæ are most delicately marked with black, each joint having two round black dots; the cases of the middle and hind legs are almost entirely black. The last skin of the caterpillar is not shed, but, being gradually pushed downwards by a wriggling movement of the chrysalis during its metamorphosis, encompasses the anal segment only, and remains in this position even after the butterfly has made its escape.—*Newman.*

TIME OF APPEARANCE.—The caterpillar may be found by sweeping the grass on hedge banks in June, and the CHRYSALIS at the end of the same month; the butterfly is on the wing during the whole of July. I have never seen the slightest indication of a second brood.

LOCALITIES.—Mr. Birchall says it occnrs in the Irish county of Wicklow and near Cork, thns implying that its distribntion is not general in Ireland. It has not been observed in the Isle of Man. Dr. Buchanan White does not mention it as occurring in Scotland; but at p. 17 of the fourth volume of the "Entomologist" Mr. W. D. Robinson informs us that he has met with it commonly in Kircudbrightshire.

In the following English counties it is reported to be common:—Bedford, Berks, Bucks, Cambridge, Corwall, Devon, Gloncester, Durham, Essex, Hants, Hereford, Hertford, Huntingdon, Kent, Middlesex, Monmouth, Somerset, Stafford, Suffolk, Surrey, Sussex, Wilts, and Worcester.

In the following English counties its occurrence is recorded without note of abundance or rarity:—Cheshire, Lancashire, Norfolk, Northampton, Northumberland, Warwick, and York.

From Derbyshire, Lincolnshire, Nottinghamshire, Oxfordshire, Shropshire, and Westmoreland I have no records of its occurrence, although the lists from some of these counties are remarkably complete.

28.—The Ringlet (*Epinephele Hyperanthus*). Upper side.

Under side.

28. The Ringlet.—The hind margin of the fore wings is rounded, that of the hind wings slightly scalloped; the colour of all the wings is dark sepia-brown or smoky black, with an indication, and nothing more, of the ocellated spots I am about to describe as present on the under side. The under side is uniform umber-brown, sprinkled with fulvous scales sufficiently numerous to tinge the whole under surface slightly with fulvous. There is a series of eight circular spots parallel with the hind margin; three of these are on the fore wings and five on the hind wings; the two spots on the hind wings which most nearly approach the fore wings stand rather farther from the hind margin than the other three, and are generally united; all these spots are black, with a white pupil and a very pale circumscription.

Six Varieties of the Under side in Mr. Bond's collection.

Varieties.—The white-pupilled spots on the under side are liable to great variation in intensity and magnitude; in some specimens they are dwindled to mere points, and from others they are entirely absent. The beautiful series of six under sides figured on the preceding page is in the cabinet of Mr. Bond, and has been most kindly lent purposely for this work. It is extremely interesting, as showing how a character, supposed to be of specific value, can be modified, and indeed entirely lost, without inducing the slightest doubt as to the propriety of uniting all these dissimilar individuals under one specific name.

Life History.—The egg is laid singly, in July and August, on several species of grass, of which the common millet grass (*Milium effusum*), the tufty hair grass (*Aira cæspitosa*), and the annual meadow grass (*Poa annua*), have been more particularly observed, but the common couch grass (*Triticum repens*) is the species which the caterpillar described below selected, by preference, for food in confinement. The caterpillar attains but a small size during the autumn, and hybernates at the roots of the various grasses on which it feeds, but crawls out and begins feeding again very early in the year, and by the end of March is often half-grown; it feeds during the night, and cannot readily be found, unless diligent search be made with a lanthorn among the long grasses so commonly growing along our hedgerows and ditches, more especially in the neighbourhood of woods. The individual specimen which I have described was full fed on the 4th of July: it then rested in a straight position, was very quiescent, and indeed exhibited a great reluctance to motion of any kind: when disturbed it fell off its food-plant, feigning death, and assuming a crescentic form, but the two extremities never touched; in this form it secretes itself at the roots of grasses, and does not reascend until the apprehended danger has passed. The head is exserted, and is wider than the second segment, and covered with minute bristle-bearing warts, which make it rough and scabrous; the body is fusiform, the sides dilated, and the dilatation fringed with strong bristles; the anal extremity terminates in two points, directed backwards; the dorsal surface is wrinkled transversely, each segment being thus distinctly divided into sections. The colour of the head is pale wainscot-brown, each cheek having three slightly darker but faint broad stripes; the ocelli are crowded together on each side of the mouth and intensely black; the body is very pale wainscot-brown, with a medio-dorsal darker stripe, in which are still darker and obscurely quadrate spots at the interstices of the segments; from the tenth segment to the thirteenth, both inclusive, the medio-dorsal stripe is continuously of the darker brown; the lateral dilated skinfold is almost white; the spiracles are intensely black; the rest of the dorsal surface is marked with very irregular brown lines. Towards the end of June it attaches itself by the anal claspers, and, hanging with its head downwards, is transformed into a short and very obese chrysalis, the head of which is rounded and undivided; the anal extremity, that is, the thirteenth segment only, is very attenuated and flattened, the extreme tip still narrower, slightly incurved, and terminating in a row of minute hooks, by means of which it adheres to a slight web which the caterpillar had previously spun, and from which it had suspended itself. The colour of the chrysalis is pale wainscot-brown, with a semitransparent appearance in the wing-cases, which, as well as the antennæ, are delicately clouded and reticulated with darker brown; the dorsal surface is also delicately dotted with brown, as well as having larger spots methodically arranged; a pair of these, transversely elongate, but arranged longitudinally, form an almost medio-dorsal series on each side of each segment.—*Newman.*

Time of Appearance.—The caterpillar is full fed about the beginning of June; the chrysalis is usually found towards the end of the month; and the butterfly continues on the wing throughout July. There is only one brood.

Localities.—Widely distributed. Mr. Birchall says that in Ireland it is rather local:

he observed it in profusion near Galway and in Malahide Park. It has not yet been observed in the Isle of Man. In Scotland it also occurs. Dr. Buchanan White says it is a local species in Perthshire, and he believes it is only found in the lowland part of the county. It occurs on Kinnoul Hill in Glenfarg. Skye is the most northern locality in Scotland at present known for the species. In England it is common, but local. Mr. Naish found it flying in incredible numbers in the woods adjoining Weston-super-Mare, and I have seen it in like profusion in many places.

Obs.—I have thought it desirable to write two descriptions of the butterfly which follows next in succession; thus not only differentiating the two forms, but leaving the reader at liberty to consider them "races," "varieties," or "species," according to his own judgment.

29.—Marsh Ringlet (*Cœnonympha Davus*). Two Upper sides and two Under sides.

29. The Marsh Ringlet.—The wings are rounded, and their hind margin is simple: the colour of the upper side is pale dingy fulvous in the females, darker in the males; a straight transverse pale mark crosses the middle of the fore wings in the females, and between this and the hind margin are two circular pale spots distant from each other and nearly equidistant from the hind margin; these spots have a black centre, but they are always indistinct, and sometimes altogether absent: the hind wings are rather darker than the fore wings, especially about the base and hind margin, but there is a pale blotch of uncertain shape extending from the centre of the wing to the costal margin, and there are traces of a series of circular spots parallel with the hind margin. The under side of the fore wings is partially divided by a straight pale bar, or a portion thereof, crossing the middle of the wing, but sometimes the upper portion of the bar alone is perceptible; the basal area within this bar is fulvous brown tinged with rust-colour, which colour also extends along the inner margin to the anal angle; the apical angle is brownish gray, and generally contains a pale circular spot with a black centre: the hind wings are brown and clothed with fulvous hairs; an irregular pale bar crosses the middle of the wing, and this is invariably broken or interrupted in the middle; intermediate between this bar and the hind margin is frequently a series of six circular spots, which are black with white pupils and a pale circumscription; these are always indistinct, often reduced to mere points, and sometimes entirely absent; and the hind wings, being covered with rather long glossy hairs or hair-like scales, have a somewhat shaggy appearance.

Obs.—This insect is certainly the Typhon of Haworth, but as certainly the Davus of Fabricius, whose earlier name must be adopted.

Life History.—The life history of this insect is unknown, unless, indeed, it may be supposed identical with that of the following.

Time of Appearance.—From the second week in June to the end of July.

Localities.—Generally spoken of as a

northern insect, but the term is scarcely precise. It occurs abundantly in the extreme south of Ireland; Mr. Birchall informs me me that this insect is especially common in the counties Galway, Mayo, and Kerry. The Honourable Miss Lawless says it is extremely abundant in the bogs of Connemara. Mrs. Battersby has taken very fine specimens in the Cromlyn bogs about Rathowen; and I have myself had the pleasure of taking it in the county Donegal. It has not been observed in the Isle of Man. In Scotland it is far from uncommon. Mr. Young, of Paisley, writing in the "Entomologists' Weekly Intelligencer" on the 29th June, 1857, says that Davus has made its appearance on the heaths and mosses in the vicinity of Paisley, and is unusually abundant. Dr. Buchanan White says that "it is not so widely distributed in Perthshire as might have been expected. There are many suitable localities near Perth where it ought to occur, but as yet it has not been detected in them: it is common at Rannoch and in other Highland districts, and is found at a considerable elevation: it appears to be abundant throughout Scotland." Dr. White adds that it occurs on the Scotch mountains at an elevation of upwards of two thousand feet.

Orkney. I have a pair of Davus from Orkney almost white—*Henry Doubleday.*

Shetland. Several specimens have been taken in Shetland; and one of these, obligingly lent me by Mr. Birchall, is figured. It is the third in the series.

Rothlieb's Marsh Ringlet.—The wings are rounded, and their hind margins simple: the colour of the upper side is dull fawn-colour, darker towards the margins; and the hind wings, especially towards the base, are darker than the fore wings; on the fore wings are two, and on the hind wings four, obscure cirenlar smoky brown spots, each having a pale circumscription; in many specimens an additional spot is visible on the costal margin; these spots form an irregular series parallel with the hind margin, and have a semitransparent appearance; in fact, their presence may be due, in a good degree, to the thin and semitransparent character of the wing, which admits of the corresponding spots on the

Rothlieb's Marsh Ringlet (*Cœnonympha Davus*, var. *Rothliebii*). One Upper side, five Under sides.

under side being seen through. The under side of the fore wings is divided by a straight pale bar which crosses the wing a little beyond the middle into two distinct areas; the basal area is fulvous-brown, tinged with rust-

colour; the hind-marginal area is duller, and contains a series of circular black spots half way between the transverse bar and the hind margin; these spots are generally four in number, three near the apical angle being closely approximate, almost contiguous; and the other, which is less distinct, being nearer the anal angle: the second of these spots, counting from the costa, has generally a white pupil, the others are generally without: the hind wings are dark brown at the base, thickly sprinkled with fulvous scales; beyond the brown basal area is a pale oblique band crossing the middle of the wing in a very irregular manner, and always interrupted near the middle; the hind-marginal area beyond this band is divided by the wing-rays into seven compartments, each of which contains a circular black spot with a white pupil and pale circumscription; these seven spots form a semicircular series parallel with the hind margin; the seventh, situated at the anal angle, is often absent, and the sixth is often double; the others vary in intensity and magnitude, as shown in the figures, and are often very beautiful.

Obs.—The underside has not that gray and shaggy appearance which I have described as characteristic of the typical Davus.

Obs. 2.—This insect is undoubtedly the Davus of Haworth, but not of Fabricius, who certainly applied that name to the preceding insect.

Obs. 3.—The ten very accurate figures engraved to illustrate this species have been kindly lent by Mr. Bond and Mr. Birchall.

Life History.—The egg is barrel-shaped, the sides convex and delicately ribbed; it is attached by the lower extremity to the linear setiform leaves of beak-rush (*Rhynchospora alba*), on which it is laid at the end of June, always singly, and generally only one on a leaf, but sometimes two, and very rarely three. The young caterpillars emerge in fifteen days, and crawling to the extremity begin feeding; they feed during the day, and grow very slowly; they rest on the leaves in a perfectly straight position, but on being annoyed fall from their food on the *Sphagnum* or other mosses among which the *Rhynchospora* usually grows, and there lie in a bent posture, as if dead, until all appearance of danger has passed, when they reascend the leaves: when among the moss it is almost impossible to detect them. At the end of August those under my care ceased to eat, and on the 1st of September I made the following description:—The head is semiglobose, wider than the body, slightly notched on the crown, and beset with minute hairs; the body is linear, its sides almost parallel, but slightly and gradually attenuated towards the anal extremity, which terminates in two points directed backwards; the dorsal surface is transversely and regularly wrinkled, and is covered with minute warts, which under a pocket lens give the surface the appearance of extremely fine shagreen; the dorsal wrinkles divide each segment into four sections, in addition to which there is a transverse skin-fold between the sections, and this has often the appearance of being double, so that each segment has the appearance of having five and sometimes six sections. The colour of the head is dingy semitransparent green; the ocelli are very prominent and intensely black; the colour of the body is dingy green, with five narrow, equidistant, distinct, purple-brown stripes; the interspace between the second and third stripe on each side is intersected by a very narrow and indistinct stripe, almost similar in colour to the other five, and the exterior purple stripe on each side is bordered below by a pale glaucous, almost white stripe, extending throughout its entire length. Immediately after this description was written the little caterpillars disappeared, probably secreting themselves at the roots of their food-plant. In the spring of 1865 I saw nothing more of these hybernating caterpillars, but received a fresh supply on the 26th of May, when they appeared full fed. The caterpillar then rests in a perfectly straight position on the blades of the beak-rush, falls off its food-plant when annoyed, and remains quiescent for some time as if dead, in a somewhat bent position. At this date I made a second description:—The head

is rather wider than the second segment, distinctly exserted, prone and rough with minute warts; the body is cylindrical, and very gradually attenuated towards the anal extremity, which terminates in two parallel points above the anal flap, and directed backwards; the surface of the body is almost smooth; warts, indeed, are observable, but so minute as not to communicate a scabrous appearance, nor are there any noticeable hairs or bristles. The colour of the head and body is apple-green, inclining to olive-green; the head is dull, opaque, and uniformly coloured; the body is striped; there is a narrow mediodorsal stripe dark purple-green, bordered on each side by a still narrower yellow stripe; these three stripes terminate before the anal points; on each side are two pale yellow stripes, one above, the other below, the pale brown spiracles; the upper of these is bordered above and below with dark blueish green, and terminates in the anal flap, which is tinged with pink; the lower terminates before the anal flap; the ventral surface, legs, and claspers are bottle-green. Two days subsequently—namely, on the 28th of May—they underwent pupation. The CHRYSALIS has the head truncate and slightly produced at the angles and also in the middle; the wing-cases are very slightly produced at the shoulders; the thorax is dorsally convex, with a very slight median keel; the chrysalis is suspended by minute caudal hooks from a white silken web spun on the edge of a leaf of its food-plant; the colour of the wing-cases is pale brown, with a darker arcuate median linear mark extending from the base to the margin, and a much shorter mark of the same colour in front of this, originating in the disk, but also extending to the margin; the head, thorax, and abdomen are apple-green, sprinkled with dingy whitish green. The butterflies produced from the individuals described appeared on the wing on the 4th and 5th of June. I am indebted to Mr. Hudson, of Bawtry, for specimens of the egg, caterpillar, and chrysalis; for a supply of the food-plant; and for information respecting the economy of this species.—*Newman.*

Obs.—At page 35 of the first volume of the "Entomologists' Weekly Intelligencer," Mr. Joseph Chappell states that the caterpillar also feeds on the cotton grass, near the roots, in May.

TIME OF APPEARANCE.—End of June, July, and sometimes in August and September.

LOCALITIES.—It has never been found in Ireland, the Isle of Man, or Scotland. The English localities are as follow:—

Cheshire. In Delamere forest — *Noah Greening.*

Cumberland. On all the mosses in Cumberland, and I obtained a specimen last season, taken along with *Epiphron*, that almost looked like a new species, the black spots being as clear and bright as in *Tithonus*, and the spots were differently placed. I call it the Polydama variety—*J. B. Hodgkinson.*

Durham. This insect frequents our wet mossy bogs in July, and I have taken it also late in June and early in August. Needless Hall Moor, moors about Cambo, Prestwich Carr, Muckle Moor, near Hayden Bridge; moss near Craigclough, moors near Shull—*William Backhouse* in "Wailes' Catalogue."

Lancashire. Simmon's Wood Moss—*Edwin Birchall;* Chat Moss, near Manchester, 6th September, 1868—*Joseph Leigh* in "Entomologist," iv. 147.

Northumberland. Plentiful in Prestwich Carr before it was drained; I have not heard of any captures lately—*William Maling.*

Staffordshire. Chartley Park, near Uttoxeter—*Stainton's "Manual."*

Westmoreland. Abundant in the mosses at Witherslack in June and July—*J. B. Hodgkinson.*

Yorkshire. Thorne Moor, near Doncaster—*Alfred Ecroyd;* Hadfield Fens—*E. Birchall.* I took it at Thorne Moor, but wasted, and had specimens given me from Cottingham, near Hull. In visiting this latter locality, I find it differs from Thorne Moor, which is mossy or spongy; but the Cottingham locality is rather like those spots where I have taken Davus in Scotland—*J. C. Dale,* "Zoologist," 191.

30.—The Small Heath (*Cœnonympha Pamphilus*). Upper side.

Under side.

30. The Small Heath. — The wings are rounded; the hind margin of the fore wings is simple, of the hind wings waved; the colour of the upper side is pale delicate fulvous, the hind wings being slightly darker than the fore wings, and the hind margin of all the wings being also darker; near the apical angle of the fore wings is a circular brown spot. On the under side the fore wings have the disk fulvous, the tip ochreous, and the hind margin gray; the ochreous area at the tip contains a circular black spot with a white pupil and a pale ochreous circumscription, and again enclosing this is a second ring, rather darker, yet very indistinct; the hind wings have the basal area dark brown, their marginal area gray; the division between these areas is irregular, but very decidedly marked; the gray or marginal area has a median transverse darker cloud, in which the position of a series of ocellated spots is indistinctly indicated by mere dots.

Life History.—The eggs, which are oblong, with a truncated base by which they are attached, are laid on the leaves of the small mat-grass (*Nardus stricta*) and several other species of grass, in May and June; the caterpillar emerges in fourteen or fifteen days, and is full fed in about thirty days, or at the end of July; it then rests in a perfectly straight position, reposing on the stalk of the grass. The head is subglobose, and slightly broader than the second segment; the body is somewhat fusiform, gradually attenuated towards the anal extremity, where it terminates in two short points directed backwards: the dorsal surface of each segment is divided transversely into narrow sections, and these sections, being covered with minute scabrous points, give it the appearance of being finely shagreened; the colour of the head is opaque green, the mouth and ocelli almost black; the body is delicate apple-green, with a clearly defined and moderately wide medio-dorsal darker stripe, bordered on both sides by a narrow paler stripe; on each side, and including the spiracles, is a broader and less clearly defined dark green stripe, bordered towards the ventral surface by a narrow but very distinct bright yellow-green stripe; the spiracles are wainscot-brown, and each emits towards the head a faint nebulous paler line, reminding one of the tail of a comet; about equidistant from the dark medio-dorsal stripe and the yellow-green subspiracular stripe is a third stripe of two tints, its dorsal margin dark green, its ventral margin yellow-green; the anal points are pink; the legs are tinged with pink; the claspers are concolorous with the ventral surface. When full grown my specimen spun a little band of white silk round a stalk of the common knot-grass (*Polygonum aviculare*), and, suspending itself therefrom by the anal claspers, changed to an obese chrysalis, suspended by anal hooks; the head of the chrysalis is broadly truncate, the thorax dorsally rounded, the colour vivid apple-green, and delicately irrorated with white dots; the costa of the wing-cases is decorated with a double stripe, the outer portion of which is purple-brown, the inner white.—*Newman.*

Time of Appearance.—The caterpillar of this insect, as already described, is to be found full fed at the end of July, and the chrysalis immediately afterwards. I have taken the butterfly in every month from May to October, both inclusive, but have found it especially abundant in June.

Localities.—This common butterfly occurs on all our heaths and rough pastures. Mr.

Birchall says it is common everywhere in Ireland, and he also records it as an inhabitant of the Isle of Man. Dr. Buchanan White says it is a very common species in Scotland in open places, in woods, and on the moors. Its range extends far up the hill sides. Scotch specimens are larger and darker than English ones.

BUTTERFLIES WHICH HAVE GIRTED CHRYSALIDS (IN SCIENCE *SUCCINCTI.*)

I HAVE now arrived at the second division of those butterflies which I have called "Exposers," from the fact of their chrysalids being exposed to the full influence of weather and light, as explained at page 18. The first subdivision of the Exposers is called SUSPENDED, because the chrysalis is suspended with the head downwards; this second subdivision is called GIRTED, because the body is supported by a silken girth or belt. This belt is sometimes, but not always, perfectly free, so that it could be moved backwards and forwards on the surface of the back. In several species it is fixed firmly in its place by the overlapping of the fifth dorsal segment or plate at the moment when the caterpillar casts its final skin. Prior to this event the belt may be seen to pass over the back, but after the change to a chrysalis has taken place it is no longer perceptible beyond the inner margin of the wing-case, where it appears as though entering the body by a minute aperture, and as passing through the body and again reappearing at a corresponding aperture on the opposite side; in fact, the appearance is exactly the same as if the belt had been passed, by means of a needle, completely through the body, going in at one side and out at the other. The fabrication of the belt is a most interesting process: the caterpillar, clinging to a coverlet or network of silk spread over the surface of some perpendicular object, turns his head in one direction until it nearly touches the middle of his side; he then spins from his mouth a silken thread, attaching the end thereof to the silk already spread to receive it. Having made the thread fast at this spot, he may be said to carry it in his mouth over his back to a similar spot on the other side of his body, where he again makes it fast; and thus a first step is taken in the fabrication of the belt: the operation is repeated twenty, thirty, or even forty times, and an equal number of threads pass over his back. These silken threads, like those in each strand of a cable, unite in forming a single strand, and seem not only to be parallel, but to adhere to each other. I can detect no movement by which they are twisted together, but, nevertheless, they are united, and it is only when forcibly broken that the number of single threads becomes manifest. The required number of threads being produced, the caterpillar rests from his labour and waits the hour of transformation. The subdivision contains two Natural Orders.

Natural Order III.—WOODLOUSE-SHAPED (in science *Oniseiformes*).

The distinguishing character of which is that the caterpillar is shaped like a woodlouse; its head is very small, and completely retractile within the second segment; the legs and claspers are also concealed by the dilated sides of the caterpillar. The chrysalis is obese and generally rounded; it is attached by the tail as well as supported by the silken band or belt already described. The British butterflies contained in this order are generally divided into two families, distinguished by the perfection or imperfection of the fore legs in the male.

Family 7.—DRYADS (in science *Erycinidæ*).

The only notable distinction between this and the following family is in the perfect insect, the males of which, in the *Erycinidæ* have only four perfect legs, while the females have six.

31. DUKE OF BURGUNDY.—The fore wings have the costal margin very nearly straight, the tip blunt, but not rounded, and the hind

margin simple; the hind wings have the hind margin scalloped and the anal angle slightly produced. The colour of the fore wings is dark brown, with three irregular transverse bands of bright fulvous spots; the first band, nearest the base, is composed of four such spots; the second, crossing the middle of the

31. Duke of Burgundy (*Nemeobius Lucina*). Upper side.

Under side.

wing, has six such spots, that nearest the costal margin being much smaller than the rest, and being accompanied by a linear ochreous spot still nearer the margin; the fourth spot in this band, counting from the costal margin, is out of the regular series, and more distant from the base of the wing; the third band is almost marginal, and is composed of six spots, of which that nearest the costal margin is smaller than the rest, and is accompanied by a linear ochreous spot still nearer the costal margin; the other spots composing this third band have a median black spot: the hind wings are umber-brown, with five or six longish fulvous spots about the middle, and a hind-marginal series of five or six fulvous spots, each of which has a median black spot. The fringe of all the wings is spotted, pure white and dark brown alternating regularly. The under side of the fore wings is beautifully tesselated with black and different shades of brown; the under side of the hind wings is bright rust-colour, with two transverse bands of very pale yellow or pure white spots. These are clearly defined and very beautiful; the first, near the base, is composed of five spots; the second, near the middle of the wing, is composed of nine spots. There is also a marginal series of six wedge-shaped black spots, each of which stands on a yellow spot, and points towards the base of the wing.

Life History.—The eggs are laid about the 1st of June (I give this as a medium date, having no doubt that the period of oviposition may extend over twenty days), on the under side of the leaves of the cowslip (*Primula veris*) or primrose (*Primula acaulis*), either singly or in clusters of four or five; their shape is spheroid, depressed at the south pole or base, and produced at the north pole or apex; their colour is pale glaucous. The caterpillar emerges about the fourteenth day, and remains on the under side of the leaf, in which it makes small round holes, thereby indicating its presence; it continues to feed for several weeks, the duration of the caterpillar state being dependent on temperature. When full fed, it rests with its under surface closely appressed to the leaf; but if touched or annoyed it falls from its food-plant, lying motionless on its side, and bending its body in a crescentic form, the two extremities approaching, but not meeting. The head is narrower and every way smaller than the second segment, into which it is received and sometimes completely withdrawn; the body is somewhat woodlouse-shaped, the dorsal surface being convex, and the ventral surface flat; the legs and claspers are concealed; the divisions of the segments are deeply incised and well defined; each segment emits about forty hairs or bristles, of which those on the back are slightly arched, those on the sides straight. The colour of the head is pale wainscot-brown; it is shining and hairy, the hairs and ocelli are black; the colour of the body is dingy white, with an indistinct medio-dorsal stripe of a smoky olive tint, apparently in great measure due to the presence of food in the alimentary canal, an inference that receives support from the fact of the stripe being partially interrupted at the segments; on each side is a waved olive stripe, also interrupted at the segments, and thus divided into a number of short oblique lines, each of which

terminates in a yellowish dot; on each segment, between the medio-dorsal and lateral stripes, is an orange-coloured, wart-like and hairy spot; there is a second indistinct lateral stripe near the spiracles, which is olive-green at its anterior extremity, but fades into yellow towards the anal extremity: the spiracles are black; the ventral surface is pale olive-green. The CHRYSALIS is obese, and its head rounded; it is attached by the tail, and also by a belt round the waist, to the leaf or petiole of the food-plant; all parts of the body emit longish hairs, in the same manner as the caterpillar: the colour is the most delicate pale wainscot-brown, with a number of black spots; the principal of these are—a narrow band passing over the neck immediately behind the base of the antenna-case; a shorter band behind this, but in front of the thorax; a short stripe on the costa of each wing-case, and numerous subquadrate spots spread over the entire dorsal surface; these are disposed in two dorsal series of eleven each, and two lateral series on each side; these spots are irregular and minute on the thorax, but regular and conspicuous on the abdomen, where is also a third intervening series of minute dots; all the hairs are sienna-brown. It remains in the chrysalis state throughout the winter.—*Newman.*

TIME OF APPEARANCE.—Caterpillar on the under side of cowslip and primrose leaves in June, July, and August; the chrysalis during the winter, and the butterfly in June.

Obs.—At page 44 of the third volume of the "Entomologist," Mr. Wright announces that he bred two specimens on the 8th February; and at page 204 of the same volume the Rev. H. Harpur Crewe records that he reared a second brood of *Lucina* in 1865. He says the larvæ grew up and assumed the chrysalis state very rapidly, and he left them, supposing they would remain in that state until the following summer; but on looking into the cage in October, he found the perfect insects had emerged, and were dead and dry.

LOCALITIES.—Always in woods, flying along the roads and pathways with a giddy zig-zag flight, and occasionally settling on twigs six or eight feet from the ground; apparently fonder of leaves than flowers, on which it seems rarely to feed. I doubt its occurrence in Ireland, notwithstanding the following note from the pen of Mr. Birchall:—

"In Mr. Tardy's collection, now incorporated with that of Trinity College, Dublin, there are specimens of this insect, but I am unable to say where captured, most probably in the county Wicklow, a county he searched assiduously for many years. I have not met with the insect."—*Edwin Birchall.*

With such diligent and energetic resident entomologists as Mrs. Battersby, the Hon. Miss Lawless, and Mr. Fetherstonhaugh, it cannot long remain unknown if it be really a native of the Emerald Isle. It has not been found in Scotland or the Isle of Man. In England it has a wide, but what may be called a capricious range, as the subjoined localities will show.

Bedfordshire. Clapham Park Woods—*Stainton's "Manual."*

Berkshire. Burghfield, near Reading—*C. S. Bird.*

Buckinghamshire. Drayton Beauchamp, Aston Clinton, Buckland, Claydon—*H. H. Crewe;* Halton—*Joseph Greene.*

Cumberland. Not rare—*J. B. Hodgkinson.*

Derbyshire. Via Gallia, near Cromford—*H. H. Crewe.*

Devonshire. Rare; not in the Plymouth district, and not known to occur farther west than Dartmouth; Dunsford Wood, near Dartmouth—*J. J. Reading.*

Dorsetshire. Glanville's Wootton, Middlemarch Woods, Cranbourne Chace, rare of late years—*J. C. Dale.*

Essex. St. Osyth—*W. H. Harwood.*

Gloucestershire. Wootton-under-Edge; in the open parts of our woods very local, but generally abundant where found—*V. R. Perkins;* Painswick, Daneway Common, Sapperton—*M. G. Musgrave;* Guiting—*Joseph Greene;* common at Dursley—*Evan John.*

Hampshire. Near Brockenhurst *F. Bond;* in the New Forest, but not common—*G. B. Corbyn;* Crabbe Wood, near Winchester, tolerably abundant—*G. H. Raynor.*

Herefordshire. At Hunters Gate, Oakley Park—*F. E. Harman;* Briarly Wood, near Leominster—*E. Newman.*

Hertfordshire. Berkhampstead, common—*G. H. Raynor.*

Huntingdonshire. Monk's Wood — *F. Bond.*

Kent. Birch Wood, Joynson's Wood, Darenth Wood, wood at Chislehurst, West Wood on Shooter's Hill towards Welling—*E. Newman;* common on the borders of woods, abundant at Faversham — *H. A. Stowell;* Collyer's Wood—*W. Machin;* woods generally north and south of Barham Downs—*W. Oxenden Hammond.*

Lancashire. Not rare in North Lancashire, Grange, &c.—*J. B. Hodgkinson;* Silverdale—*James Murton.*

Lincolnshire—*T. H. Allis.*

Northamptonshire. Barnwell Wold, the Lynches, near Peterborough—*Frederick Bond;* near Towcester—*Hamlet Clark.*

Oxfordshire. Stowe and Bagley Woods and Wychwood Forest—*W. H. Draper.*

Somersetshire. Weston-super-Mare—*A. E. Hudd.*

Suffolk. Near Stowmarket—*H. H. Crewe;* Brandeston and Playford—*Joseph Greene.*

Surrey. Haslemere: This species occurs here in an extensive copse intersected with deep valleys: it frequents the bottoms of these valleys, where it flits about over the underwood, almost always returning to one particular spray; indeed, certain bushes, and even twigs, seem to be especially to their taste, since if one be taken another soon occupies its place. In this way one alder bush afforded me two or three specimens; and a little oak bush, in a particularly warm and pleasant corner, was always sure to have a fresh tenant in a few hours, or, at any rate, in a day or two after the previous occupant had been captured. Occasionally, though rarely, a specimen would settle on a spurge bloom, the only flower they appeared to affect.—*C. G. Barrett*, in "*Entomologists' Monthly Magazine*," No. 29.

Sussex. Watergate Hanger — *William Buckler;* Frenchlands Wood—*J. H. White.*

Westmoreland. Witherslack, not rare—*J. B. Hodgkinson.*

Wight, Isle of. Near Ryde—*F. Bond;* Parkhurst, Quarr Copse, Whiteford Wood—*Alfred Owen;* in woods, but not common—*James Pristo.*

Wiltshire. Manton and Rabley coppices, West Woods—*T. A. Preston.*

Worcestershire. Taken sparingly about two miles from Great Malvern—*W. Edwards.*

Yorkshire. Abundant near Pickering in 1868—*J. H. Rowntree;* Scarborough, Sheffield, York, Leeds—*Edwin Birchall;* Doncaster—*Alfred Ecroyd.*

Family 8.—Argus Butterflies (in science *Lycænidæ*).

In the general characters of their caterpillars and chrysalids they closely resemble the *Erycinidæ*, but in the perfect state they differ in having all the six legs perfectly formed for walking in both sexes. They are further divided, both by English entomologists and by technical authors, into Hairstreaks (in science *Thecla*), Coppers (in science *Polyommatus*), and Blues (in science *Lampides* and *Lycæna*).

32.—Green Hairstreak (*Thecla Rubi*). Upper side.

Under side.

32. Green Hairstreak.—The costal margin of the fore wings is nearly straight, the tip blunt, and the hind margin simple; the hind margin of the hind wings is scalloped, the point nearest the apical angle being slightly produced. The colour of the upper side is dark brown, exhibiting metallic reflections in a strong light; near the base of the wings are

numerous scattered scales of a metallic blue lustre; the costal margin is narrowly edged with bright rust-colour: the hind wings have a still more slender line of the same colour, followed by a black line, and this again by a white fringe. The under side is green, the costal and hind margin of the fore wings being narrowly edged with rust-colour, and the inner margin broadly streaked with brown; the hind margin of the hind wings is narrowly edged with rust-colour just within the fringe, which is alternately dark brown and snowy white. A transverse series of differently shaped white spots crosses all the wings about the middle, but their presence, as well as their size and shape, seems very uncertain; in some specimens the series is tolerably consecutive across all the wings, and every gradation may be found between such a consecutive series and a solitary white spot on the costal margin of the hind wings.

Life History.—In Hubner's figures of European caterpillars there are three representations of the caterpillar of the Green Hairstreak: one of them is represented on the sun cistus, and the other two on what appears to be a species of heath, or, perhaps, the crow berry; in all these figures the head is represented as very small and black, the body as woodlouse-shaped and green, with a mediodorsal and two lateral yellow stripes; it also has a lateral series of eight or nine oblique yellow lines. The chrysalis is very obese, dark brown, and hairy, with a distinct belt round the waist, and apparently an attachment at the anal extremity.—*Hubner's figures.*

Obs.—Lewin says:—"The caterpillars of this small fly feed on the buds and blossoms of the bramble, and when young artfully conceal themselves in the bud. They are at their full growth the beginning of July. They then retire to a convenient place for the security of the chrysalis, and fasten themselves with a slender thread round the middle and by the tail: thus secured, they change to chrysalids. The butterfly comes forth the first week in the following May." Lewin has figured the caterpillar of a pale green, with a brown dorsal stripe, and oblique white stripes on the sides.

Obs. 2.—Mr. Doubleday observes:—"There is something curious about the caterpillar of the Green Hairstreak. I think Guenée says, in his volume on the "European Butterflies," that he has found this caterpillar on Broom and *Genista*, and I believe it has been found here at Epping on these plants."

Time of Appearance.—The butterfly is on the wing in May and June.

Localities.—Mr. Birchall says it is common in Ireland, in the counties Dublin, Wicklow, and Kerry, and the Honourable Miss Lawless informs me that it is very abundant in the same localities as the Marsh Ringlet: that is, on the bogs and hills of Connemara and Mayo, but not extending so high on the hills; it occurs in May and the beginning of June. Mrs. Battersby says it is frequent on moors, and Mr. Marsden says he has taken it in Galway. It has not been taken in the Isle of Man; but in Scotland it is not uncommon. Dr. Buchanan White says "that although apt to be overlooked, it is widely distributed in Perthshire, occurring in several places near Perth, as well as at Rannoch. I have taken it in Inverness-shire, north of which it does not seem to have been observed: it appears to be single-brooded in Scotland." Dr. White gives the following dates:—"1858, May 20; 1863, May 30; 1867, June 28; 1868, May 9; 1869, May 1." In England it occurs in nearly all the county lists I have received, and when absent its absence may be supposed to arise from the want of observation.

33. Purple Hairstreak (*Thecla Quercus*). Upper side of Female.

33. Purple Hairstreak. The costal margin of the fore wings is almost straight, and the tip rather pointed, especially in the males; the hind margin is slightly waved: the hind wings are slightly scalloped, and the last

point before the anal angle is slightly produced. On the upper side all the wings are brownish black; every part in the males, except the margins, has a purple reflection; in the females this purple reflection is confined to a patch occupying a portion only of the fore wings, all the margins and the apical area of the wing being destitute of the purple

Under side.

colour. The under side is delicate gray, inclining to drab, with a transverse white line on all the wings; that on the fore wings is very straight, but imperfect, not reaching the inner margin; in the hind wings the first costal half only is straight, the inner-marginal half is twice bent, and assumes somewhat the form of the letter W; there is a bright orange spot at the anal angle of the hind wings, and a circular black-pupilled orange spot near the anal angle and also near the hind margin: the space between the white line and the hind margin contains a double series of pale smoke-coloured markings.

Life History. The egg is laid on the twigs of the oak (*Quercus Robur*) in July, and remains in that state during the winter, hatching in the spring, and the young caterpillar feeding on the oak leaves; the caterpillar is full grown in June, and then closely resembles that familiar shell, the *Chiton*, and rests appressed to the surface of the leaf, just as the *Chiton* to the surface of rock; the head is small and retractile: the incisions between the segments of the body are very distinctly marked, the posterior edge of one segment slightly overlapping the anterior margin of the next following segment; the back is very convex, and is intersected by a medio-dorsal groove, which is narrow and distinct on the middle segments, but becomes vague and wide towards both extremities; the lateral margin of all the segments is thin and dilated, and every part of the body is clothed with fine scattered hairs, which become conspicuous when the caterpillar is viewed in profile: the colour is dull brownish green, sometimes tinged with pink, and there is a medio-dorsal series of pinkish arrow-heads, the two moieties of which are separated near the head. In captivity this caterpillar spins no cocoon, nor does it fasten itself by any belt or anal hooks as is the manner of its tribe, but retires just below the surface of the earth, and then turns to an obese unangled brown chrysalis, which emits minute hairs from the entire surface of its body.—*Newman.*

Obs.—At p. 312 of the second volume of the "Entomologist," Mr. S. A. Davis writes thus: "Whilst collecting in July at West Wickham, I shook a small sapling ash, and observed several specimens of Thecla Quercus fly from it, and almost immediately return and settle again on the leaves, in most instances upon the same identical leaf from which they had been disturbed. Further observations proved this to be the case with most of the young ash trees in the wood, and I could have captured dozens had I been so disposed. The same day I observed about twenty specimens gambolling and settling upon an ash tree near Beckenham, no oak being near." This seems to suggest the idea that the food of the caterpillar is not confined to oak, but I have no proof that this is the case.

Time of Appearance.—The egg throughout the winter, the caterpillar in June, the chrysalis in June, and the butterfly in July and August.

Localities.—In Ireland Mr. Birchall found it common in the counties Wicklow, Dublin, and Kerry: it has not been observed in the Isle of Man. Dr. Buchanan White remarks that "it is a rarer species in Scotland and Perthshire than the Green Hairstreak; it occurs in several places in the lowland part of the county of Perth as far north as Dunkeld: although found in Argyleshire, it does not seem to occur everywhere in the south of

Scotland, as might be expected, being common in England." Dr. White took it on the 9th of August in 1859, and on the 28th June in 1860. In a "List of Lepidoptera Observed in the Vicinity of Dumfries," Mr. Lennon, the author thereof, states that the Blue Hairstreak is found in Comlorgan Wood, and at Dalscairth: the former an ancestral possession of Lord Mansfield's, about ten miles south of Dumfries, and near the coast; the latter on the slope of the wooded hills that bound to the west the valley in which the town is situated. It is reported from all the English counties wherever lists have been received, and my own experience is that it flies in some abundance about the oak trees in all our woods in the south.

34. Black Hairstreak (*Thecla W-Album*). Upper side.

Under side.

Under side of a Variety in the cabinet of Mr. Bidwell.

34. Black Hairstreak.—The costal margin of the fore wings is nearly straight, the tip scarcely pointed, and the hind margin simple. The hind margin of the hind wings is slightly scalloped, and the wing is produced, and has a very decided tail near the anal angle. The colour is black-brown, except a spot on each fore wing near the costal margin, and rather nearer the base than the tip of the wing. This spot looks as though it were semitransparent, and is of a dull smoky tint. At the anal angle of the hind wings there is an orange speck; the fringe is snowy white on the inside, black on the outside; on the tail it is quite white. The under side is grayish-brown; the fore wings have a narrow transverse waved, snowy white line rather beyond the middle; before it reaches the costal margin this line turns abruptly towards the tip of the wings: the hind wings have a snowy white transverse line, commencing at the costal margin, and at first almost straight, but afterwards forming a letter W, and then, turning upwards, it approaches the end of the butterfly's body; between this and the hind margin is a bright orange-red band, bordered above by a scalloped black line, and below by a series of semicircular black spots; both above and below this orange band is a very slender whitish streak.

Life History.—The eggs are laid on the twigs of the elm and wych elm (*Ulmus campestris* and *U. montana*) in July and August, and are shaped something like an orange, but are more depressed on the crown; they are of a whitish or putty colour, and remain firmly glued to the rind of the twigs throughout the winter. The full-fed caterpillar rests on the surface of the leaves; its head is very small and shining, and is retractile within the second segment; the body is shaped like a woodlouse, the incisions between the segments being distinctly marked, and each segment having its posterior margin slightly produced and overlapping the anterior margin of the next following segment; there is a shallow mediodorsal furrow, which bisects the ridges already described; the lateral margins of the segments are dilated, and the legs and claspers completely hidden. Every part of the body emits delicate hairs, which are very visible when the caterpillar is viewed in profile. The head is black and shining; the body delicate pea-green, the ridges bordering the dorsal furrow

being tinged with yellow, and the furrow itself tinged with brown. On each side of each segment are two slender oblique lines of a yellowish-white colour. When the caterpillar is at rest, the upper of these lines on each segment meets the lower line on the next segment, thus forming a series of eight oblique lateral lines. The CHRYSALIS is short and stout, attached to a twig, or sometimes to a leaf, by a belt, and also by the anal extremity. —*Newman.*

TIME OF APPEARANCE.—The egg has been found in the winter glued to the rind of elm twigs; the caterpillar has been beaten in June, and the butterfly taken on the wing in July.

LOCALITIES.—Mr. Birchall has not met with this butterfly in Ireland or the Isle of Man, nor does Dr. Buchanan White mention having observed it in Scotland. In England it is very widely distributed, and sometimes occurs abundantly; still, it cannot be considered a common butterfly.

Berkshire. At Burghfield, near Reading, this insect appeared in the greatest profusion in my own garden in 1829 or 1830—*C. S. Bird.*

Buckinghamshire. In gardens—*William Walker.*

Cambridgeshire. Generally distributed in the county—*Thomas Brown.*

Derbyshire. Darley, Calke Abbey—*H. H. Crewe;* Cubley, one specimen—*Joseph Greene.*

Dorsetshire. Buckland Newton very many years ago. I possess the specimen—*J. C. Dale.*

Essex. Epping—*Edward Doubleday;* in Bergholt Woods, near Colchester—*W. H. Harwood.*

Gloucestershire. Near Gloucester, but rare —*Joseph Merrin;* Clifton—*Alfred E. Hudd.*

Hampshire. One specimen has been taken in the New Forest—*G. B. Corbin;* one specimen at Southsea—*Henry Moncreaff.*

Herefordshire. One caterpillar taken at the Bache—*Mrs. Hutchinson;* rare at Oakley Park—*F. E. Harman.*

Huntingdonshire. Near Stilton—*J. C. Dale.*

Kent. Neighbourhood of Bridge, near Canterbury, occasionally—*W. O. Hammond;* caterpillar on elms near the Fox and Hounds public house at Darenth Wood—*E. Newman.*

Lincolnshire. In Lincolnshire—*T. H. Allis.*

Northamptonshire. Barnwell Wold in July —*William Bree.*

Nottinghamshire. One specimen at Newark —*George Gascoyne;* Willin Wood, near Ollerton, rare—*R. E. Brameld.*

Shropshire. Benthall Edge—*C. G. Barrett.*

Somersetshire. Brockley—*A. E. Hudd.*

Staffordshire. Burton-on-Trent and Brinlincote—*Edwin Brown.*

Suffolk. Generally distributed over the county—*H. H. Crewe;* Brandeston and Playford—*Joseph Greene;* one specimen at Wolsingham Park—*W. M. Crowfoot;* Dodnash Wood—*W. H. Harwood;* Haverhill—*W. Gaze;* Sudbury—*W. D. King.*

Surrey. Guildford, Godalming, Witley, Cobham—*E. Newman.* This species is usually esteemed a rare insect in the neighbourhood of London, and previously to the last season I never saw it alive; but the boundless profusion with which the hedges for miles, in the vicinity of Ripley, were enlivened by the myriads that hovered over every flower and bramble-blossom last July exceeded anything of the kind I have ever witnessed. Some notion of their numbers may be formed when I mention that I captured, without moving from the spot, nearly two hundred specimens in less than half an hour, as they approached the bramble-bush near which I had taken up my position. I am perfectly unable to account for their prodigious numbers, as the same fields and hedges had been carefully explored by me at the same and at different periods of the year for several preceding seasons, without the occurrence of a single specimen in either of its stages; and it is worthy of remark that the hedges to the north and north-east of Ripley were perfectly free, although the brambles, &c., were in plenty.—*J. F. Stephens.* My lamented friend has often told me of this "miraculous draught" of the Black Hairstreak, but although then living near the spot, and always on the alert for captures,

I have never seen, much less taken, at least so far as I can now recollect, two specimens of this butterfly on the same day.

Sussex. Frenchlands Woods abundant—*J. H. White;* Abbot's Wood—*C. V. C. Levett;* in Sussex generally—*W. H. Draper.*

Worcestershire. One specimen was captured near Worcester on the authority of *Dr. Hearder;* it once occurred at Great Malvern, but I have heard of none lately—*W. Edwards.*

Yorkshire. The caterpillar is common on wych elms near Doncaster—*Geo. T. Porritt;* near York and Sheffield—*Edwin Birchall;* Edlington Wood, near Barnsley—*J. Harrison;* very numerous near Doncaster in 1860—*Alfred Ecroyd;* Sheffield, at Warncliffe Wood—*Edwin Birchall.*

35.—Dark Hairstreak (*Thecla Pruni*). Upper side.

Under side.

35. Dark Hairstreak.—The fore wings are nearly straight on the costa, blunt at the tip, and simple on the hind margin: the hind margin of the hind wings is slightly scalloped; it is produced at the anal angle, and has a small but very decided tail: the upper side is dark brown, with a series of red-brown spots parallel with the hind margin of the hind wings; these spots are generally four in number, the two nearest the anal angle being larger and brighter than the other two; at the anal angle is a vague but perceptible spot composed of metallic blue scales; the margin itself is black, but its fringe pale. The under side is brown, inclining to fulvous; on the fore wings is a broken transverse snow-white line, about a third of the distance between the tip and the base; outside of this—that is, nearer the hind margin—is an indistinct row of red-brown spots; those nearest the tip of the wing are least distinct; those nearest the anal angle most so; and the two largest are accompanied by a small jet-black spot, with a snow-white margin: the hind wings have an oblique transverse snow-white line extending from the costal margin towards the anal angle, but not reaching it; parallel with the hind margin is a broad band of orange-brown, and on each edge of this band is a series of pure black spots, bordered on the outside with snowy white; the black spots in the inner series are nearly round, and the blueish white border of each is of a crescentic form; the black spots in the outer or hind-marginal series are semi-circular, and ornamented, especially at the anal angle, with metallic blue; the white border below these markings is straight.

Obs.—In September, 1828, a member of the Entomological Club purchased a number of these butterflies of a Mr. Seaman, then a well-known dealer in objects of natural history, and resident at Ipswich. The purchase was made under the impression that the butterflies were the Black Hairstreak, then a desirable insect to obtain. The purchaser most kindly distributed among the members of the club, then in its infancy, some of the specimens, and I became a recipient. The specimens are still in my possession. On examining them, and comparing them with such specimens of *W-album* as I then possessed, it immediately became manifest to me that the newly-captured species was essentially different, not only on the upper, but also on the under side. Of course, I made it my business to work out the name of the supposed novelty, and soon found, on comparing it with a continental figure, that the new insect was *Thecla Pruni*, and the old one *Thecla W-album*. Like all beginners, I was proud of my discovery, and eager to communicate the intelligence. The late Mr. J. F. Stephens then received entomologists

every Wednesday evening, and in the most kind and generous manner opened his rich cabinets and imparted his great entomological knowledge to every one who applied for information. The first Wednesday evening subsequent to my making the discovery found me at the residence of this patriotic entomologist: that night I was his earliest and most enthusiastic visitor. He gave the subject an immediate investigation, and promptly acquiesced in the necessity for a change of name, but at the same time threw a damper over my enthusiasm at the supposed discovery of a new British butterfly, by expressing a doubt whether it was British at all; and represented the intense and praiseworthy desire to do business which was prevalent among dealers in insects as occasionally overcoming the love of truth. Seaman, unconscious of the value of his capture, had given the real and now familiar locality of Monk's Wood as its habitat, and it was so announced when he first disposed of them; but no sooner was it made known that the butterflies were not the Black Hairstreak at all, but a species new to Britain, than the locality became a mine of gold; and Mr. Seaman very judiciously concluded to remove the mine to a greater distance, even to *ultima thule* of his geograpical knowledge, Yorkshire; and Mr. Curtis, who published the insect under its correct name shortly afterwards, gave Yorkshire as the locality where it had been found. Benjamin Standish, of happy memory, was at that time in full possession of his insect-hunting powers, and also of an imaginary estate and baronetcy in the north of England: how often were he and I companions to Darenth and to Birch! he was fired with ardour at the "turning up" of a new butterfly, and we consulted long and often on the expediency of a trip to Yorkshire in quest of the old baronetcy and the new Hairstreak. Alas! all the actors in this little comedy, except myself, have been removed from works to rewards; the estate and baronetcy have gone by another, and perhaps a more direct line; and the once "new" Hairstreak is in the butterfly market at a very moderate price.

Life History.—The egg is laid on the twigs of the blackthorn (*Prunus spinosa*), and remains attached to it all the winter; the young caterpillar feeds on the leaves. When full fed the caterpillar is woodlouse-shaped, the head being small and retractile within the second segment: the body is very convex on the back, with a shallow medio-dorsal furrow, and the edges of the segments adjoining this appear from the figures to form two parallel series of projecting points; the colour is pale green, the crests of the ridges and a narrow lateral stripe being yellow; the chrysalis is attached by a belt, and by the anal extremity; it is obese, blunt-headed, and humpbacked, and has a medio-dorsal series of five rather conspicuous warts or tubercles.—*Esper's and Hubner's figures.*

Obs.—I have never seen either the caterpillar or chrysalis of this species, and have relied solely on published figures, which Mr. Doubleday assures me are correct.

Time of Appearance.—June and July.

Localities.—*Theela Pruni* is unknown in Ireland, Scotland, and the Isle of Man; its range in England seems confined to five counties.

Derbyshire. In a box of insects captured within a few miles of Chesterfield I find this very local species—*J. R. Hind*, "*Intelligencer*," vol. ix., p. 27.

Huntingdonshire. Monk's Wood, on the 4th and 6th of July, but in shattered condition—*J. F. Stephens;* Monk's Wood, just appearing on the 18th June—*H. Doubleday;* near Peterborough—*Frederick Bond;* common in Overton Woods and about St. Ives, and elsewhere in Huntingdonshire—*T. H. Allis.*

Monmouthshire. I have taken a single specimen in St. Julian's Wood—*George Lock.*

Northamptonshire. Very plentiful some years, rare in others, at Barnwell and Ashton Wolds in July—*William Bree;* near Towcester—*Hamlet Clark;* Barnwell Wold—*Frederick Bond;* on the 19th June I captured three dozen *Pruni* flying round the flowers of the wayfaring tree (*Viburnum lantana*) at Kettering—*W. Sturgess*, in "*Intelligencer*," vol. iv., p. 111.

Suffolk. Brandeston and Playford—*Joseph Greene.*

36. Brown Hairstreak (*Thecla Betulæ*). Male, Female, and Under side.

36. Brown Hairstreak.—The costal margin of the wings is nearly straight, the tip obtuse, and the hind margin simple; the hind wings have the hind margin slightly scalloped, and it is produced at the anal angle into a square lobe, and near this, supported by the next wing ray, is a very decided tail. The colour is rich glossy umber-brown, with a large oblique and somewhat kidney-shaped orange-red blotch beyond the middle of the wing; this blotch contains on the edge nearest the base of the wing a crescentic dark brown discoidal spot: the hind wings have the lobe at the anal angle, and the tail orange red, the fringe is white. The under side is glowing fulvous gray, approaching to orange colour; the fore wings have two transverse white lines descending from the costa and towards the inner margin, and meeting before they reach it, thus enclosing an acutely triangular space, between which and the base is a short transverse space similarly enclosed by white lines: the hind wings have two oblique transverse white lines, both of which descend from the costal margin; that nearest the base terminates at the middle of the wing, the other is slightly waved, and terminates on the inner margin near the angle; the hind margin is bright rust-coloured. Such is a description of the female; the male is smaller, and differs in wanting the orange blotch on the upper side, and in having the under surface fulvous gray.

Life History.—The egg is a depressed sphere and white; it is attached to the twigs of blackthorn (*Prunus spinosa*) in the autumn, often as late as the end of September or beginning of October; it is not hatched until the spring, and the young caterpillar feeds on the blackthorn, generally concealing itself beneath the leaves: when full fed it rests in a flat position on the leaf of the blackthorn, with its head, legs, and claspers concealed, and it does not abandon this position readily: when compelled to do so, it falls about three inches and hangs by a thread. The head is almost globular, but slightly produced towards the mouth: it is scarcely half so wide as the second segment; indeed, the head may be said to be retractile within that segment: the body is shaped somewhat like a little boat turned keel upwards: the sides are dilated all round, even including the second segment, the anterior margin of which projects beyond the head: the segments are deeply and distinctly divided, so much as to give the back, when viewed sideways, a serrated appearance; the dilated sides and dorsal keel are each garnished with a fringe of stiff hairs; this fringe is double on the dorsal keel, which is bisected by a shallow and inconspicuous medio-dorsal furrow, but single on the lateral dilation; on the former each hair is curved into the segment of a circle, and its end is directed backwards; on the margin each hair is also curved, but more slightly, and its end is directed downwards. The colour of the head is brown, and its surface very glabrous; that of the body apple-green, with four narrow longitudinal whitish stripes, and two oblique lines of the

same hue on each side of each segment; two of the longitudinal stripes are dorsal, they are distant on the second and third segments, gradually approach on the fourth and fifth segments, and thence run parallel to the thirteenth; the other stripes are lateral, and, running completely round the margin of all the segments of the body, unite on the second and thirteenth segments; on the second segment are two short pale longitudinal lines, side by side: the ventral surface, including the legs and claspers, is pale semi-transparent glaucous green, with a vague medio-ventral smoke-coloured stripe, probably due to the presence of food in the alimentary canal. Those caterpillars in my possession were full fed early in June, and changed to CHRYSALIDS before the end of the month; these were smooth and without projections, and were of a pale semi-transparent brown colour; they were unattached either by a belt or by anal hooks, and remained at the bottom of the receptacle in which the caterpillars had been fed until they emerged in the winged state during my absence from home in July.—*Newman.*

TIME OF APPEARANCE.—The egg is to be found during the winter firmly glued to the twigs of blackthorn, the caterpillar on the leaves of the same in May and June, and the butterfly is on the wing in July, August, September, and October.

LOCALITIES.—Mr. Birchall says this species is very common in the lanes and on roadside hedges in the south and west of Ireland in August, frequenting the flowers of the bramble, and settling the moment the sun is obscured, when it may readily be taken with the fingers; it has not been observed in Ulster or Leinster. Mr. G. F. Mathew observed it at Blarney, near Cork. It has not yet been noticed in the Isle of Man, or in Scotland. In England it is very widely distributed, but still sufficiently uncommon to warrant the enumeration of a few localities:—

Berkshire. Burghfield, near Reading—*C. S. Bird.*

Buckinghamshire. Claydon — *H. H. Crewe.*

Cambridgeshire. Generally distributed throughout the Cambridge district—*Thomas Brown.*

Cumberland. I have seen one specimen in Barron Wood, near Carlisle—*J. B. Hodgkinson.*

Devonshire. Abundant both as regards number of localities and number of specimens; near Exeter—*J. Hellins;* Bickleigh Vale, near the Cider House; Bickleigh Bridge; Shaugh Bridge; Horrabridge; Dewerstone—*Geo. C. Bignell;* Whistman's Wood, near Princetown, Dartmoor; Moreton Hampstead; Tavy Vale, near Virtnous Lady Mine; Cann Wood Meadows; Plym Bridge; Torquay; Buckfastleigh; Axminster; Sidmouth—*J. J. Reading.*

Dorsetshire. Glanville's Wootton, Middlemarsh Wood, but not very lately—*J. C. Dale.*

Essex. Very abundant in Epping Forest in the caterpillar state, especially about Loughton and High Beech—*W. J. Argent.*

Glamorganshire. Scarce—*Evan John.*

Gloucestershire. Near Gloucester, but scarce—*Joseph Merrin.*

Hampshire. Near Brockenhurst, but not common in the New Forest—*G. B. Corbin;* Kimpton, near Andover—*J. C. Dale.*

Huntingdonshire. Monk's Wood—*F. Bond.*

Kent. Woods and lanes about Sheldwick—*H. A. Stowell;* caterpillar once only in the neighbourhood of Eastry—*W. O. Hammond;* Darenth Wood and skirts of Birch Wood, always at rest on flowers—*E. Newman.*

Lancashire. Not uncommon at Grange—*J. B. Hodgkinson;* Silverdale—*James Murton.*

Lincolnshire. *T. H. Allis.*

Northamptonshire. Rare in Barnwell Wold—*William Bree;* near Towcester—*Hamlet Clark.*

Suffolk. Dodnash Wood, not common—*W. H. Harwood;* Haverhill—*William Gaze.*

Sussex. Poyning's Wood—*William Buckler;* woods near Henfield—*W. H. Draper.*

Westmoreland. Witherslack in August and September—*J. B. Hodgkinson.*

Wight, Isle of. Rare near Ryde—*Frederick Bond;* I saw this insect at Whippingham several years ago, but not lately; I believe it is rare in the island—*James Pristo.*

Wiltshire. Reported as having been taken near Great Bedwyn and in West Woods; scores have been taken by the pupils at Marlborough College—*T. A. Preston.*

Worcestershire. Trench Wood, not common—*J. E. Fletcher.*

37.—Large Copper (*Polyommatus Hippothoë*). Male.

Female.

37. Large Copper.—The four wings are nearly straight on the costa, and almost pointed at the tip; the hind margin is simple and entire; the hind margin of the hind wings is slightly waved: the colour of the upper side is brilliant fiery copper in the male; the fore wings have a narrow black hind margin, and a small transversely oblong black spot halfway between the base and tip, and between this and the base of the wing is an indistinct black dot: the hind wings have a black notched hind margin, and a short, slender, median streak; the inner margin is also tinged with black. In the female the fore wings have a black hind-marginal band, broader than in the male, a transverse series of seven oblong black spots parallel with the hind margin, and three other black spots in a straight series between this and the base of the wing: the hind wings are smoky black-brown, with a broad copper-coloured band parallel with the hind margin. Although so different on the upper side, the sexes are alike on the under side; the fore wings are orange-red with gray hind margin, and seventeen velvety black spots, eleven of which are encircled with pearly gray; the others are less distinct, and form a series parallel with the hind margin: the hind wings are pearly gray, with an orange band parallel to the hind margin, and fifteen black spots on the disk, all of which have a pale gray circumscription; on each side of the hind-marginal orange band, and close adjoining it, is a series of rather indistinct black spots.

Varieties of this species are not common; in those that have passed through my hands there has been a remarkable uniformity of colouring, but Mr. Dale informs me he possesses a female almost entirely black.

Life History.—The egg is laid on the leaves of the great water-dock (*Rumex hydrolapathum*) during the month of August, and the young caterpillars (never, to the best of my belief, observed) probably emerge during the following month, and hybernate very early at the base of the petioles, a situation in which they would be particularly liable to injury, and indeed destruction, from the long-continued floods of such frequent occurrence in the aqueous districts, which constitute the sole English habitats of this brilliant butterfly. The caterpillar is full fed in June, and then lies flat on the dock-leaf, rarely moving from place to place, and, when it does so, gliding with a slug-like motion, the legs and claspers being entirely concealed. The head is extremely small, and can be completely withdrawn into the second segment: the body has the dorsal surface convex, the ventral surface flat; the divisions of the segments are distinctly marked, the posterior margin of each slightly overlapping the anterior margin of the next, and the entire caterpillar having very much the appearance of a *Chiton;* the sides are slightly dilated; the legs and claspers are seated in closely approximate pairs, nearly on a medio-ventral line. The colour is green, scarcely distinguishable from that of the dock-leaf; there is an obscure medio-dorsal stripe, slightly darker than the disk, and in all probability due to the presence of food in the alimentary canal. The chrysalis is obese, blunt at both extremities, attached by minute

hooks at the caudal extremities, and also by a belt round the waist.—*Newman.*

Obs.—My acquaintance with the caterpillar and chrysalis was made very many years ago, in Mr. Doubleday's garden at Epping, where the very plant of *Rumex hydrolapathum* on which the caterpillars fed is still in existence.

Time of Appearance.—Caterpillars beginning of June, 1841; 24th July, 1827; chrysalids, 25th July, 1827; butterflies, 25th June, 1826; 3rd and 5th July, 1833; 19th July, 1827; August, 1819; August 4th, 1821—*J. C. Dale.*

Localities.—This beautiful butterfly has never been known as an inhabitant of Ireland, the Isle of Man, or Scotland. In England it formerly occurred in abundance in two localities mentioned below, but it is now believed to be extinct.

(Cambridgeshire. In plenty at Whittlesea Mere—*J. F. Stephens;* not taken in Cambridgeshire since 1845—*Thomas Brown.*)

(Huntingdonshire. Yaxley and Holm Fens. The latest capture, consisting of five specimens, was made by Stretton, in either 1847 or 1848: they were all purchased by Mr. Harrington. I was at Yaxley for several successive years after this, but never saw another specimen, or heard of another being taken—*F. Bond.*)

38.—Common Copper (*Polyommatus Phlæas*).

38. Common Copper.—The costal margin of the fore wings is nearly straight, the tip almost pointed, and the hind margin simple; the hind wings are notched near the anal angle, and on each side of the notch is a small angular projection. The colour of the fore wings is coppery red, with a dark brown hind margin and nine black spots on the disk; seven of these form a zigzag series parallel with the hind margin; and two are situated between this series and the base of the wing: the hind wings are black-brown, with an indented hind-marginal copper-coloured band. The under side of the fore wings is fulvous, with nine black spots on the disk, and a fulvous-gray hind margin: the hind wings are fulvous-gray, with ten black dots on the disk, and a series of five reddish crescents parallel with the hind margin.

Varieties.—There is a variety of this species in which the parts which are usually copper-coloured are of a pure and brilliant white. This is of frequent occurrence on the continent of Europe, but appears to be of uncommon occurrence in this country. At page 93 of the fourth volume of the "Entomologist," Mr. Clark, of Doncaster, writes: "On May 19th a friend of mine took a most curious variety of *Phlæas*, the part which is usually of a bright copper colour being of a splendid silvery white." Several other English specimens have been recorded, and kindly offered me to figure, and I have declined them simply from the difficulty of exhibiting the differences in a wood-cut. There is also a great discrepancy in the colour of the costal margin of the fore wings; in many specimens, generally supposed to be females, this is dull dark brown; while in others the copper colour comes up to the costa: again the black spots forming the transverse series are various in size, in some specimens being much larger than in others, and being more or less connected, three near the costa and two pairs between the costa and the inner margin: and again, the wing-rays are brown in some specimens, but concolorous with the disk in others; lastly, many specimens have a series of four blue spots just above the copper-coloured band on the hind wings: these characters—that is, the larger black spots, the darker costal margin, and the blue spots—I formerly described as characteristic of the female, and I still think this is generally, but not exclusively, the case. Mr. Dale mentions a specimen without the copper-coloured band on the hind wings, but only having a few copper-coloured spots in its place. At page 211 of the third volume of the "Entomologist," Mr. C. S. Gregson describes the varieties of *Phlæas* in his own cabinet as under:—"This

species has had my especial attention for many years, and the result is a long row of aberrations; one with small red spots on the fore wings, and a broad red band on the hind wings; one dull brownish; six without markings on the hind wings; one very large, with red pencil-like streaks on the rays of the hind wings; one with one silver fore wing, all else proper; one with both fore wings silvery, the hind wings proper; six with all the copper-colour turned to silver—one of these is truly magnificent." Mr. J. A. Clark, of Hackney, has most obligingly placed in my hands some beautiful specimens, varying in the same way.

Life History.—Without that attentive and unremitting observation which I believe has not hitherto been bestowed on the subject, I am unable to say with anything approaching to certainty whether we have one, two, or three broods of this brilliant little butterfly in the course of the year; its greater abundance at the beginning of June, the beginning of August, and beginning of October, favour the idea that there are three broods; and it is quite certain that many of those caterpillars which we find during the entire month of August, and which become chrysalids in September, appear as butterflies at the end of that month or beginning of October; are we to suppose that some of the chrysalids remain in that state throughout the winter, and do not effect their final change until the following summer, so that the October and June flights are really portions of the same brood? The egg is laid on the leaves of several species of dock (*Rumex*), as *R. obtusifolius*, *R. pulcher*, *R. acetosa*, *R. acetosella*; and the caterpillar emerges in a few days, not less than ten, and seldom more than fifteen: it is full-grown in about twenty days, and then rests on the under side of the dock leaf in a flat position, closely appressed to the surface; if disturbed or annoyed it falls from its food-plant, and assumes a crescentic form, the two extremities approximating, but not meeting; after a time it resumes its wonted appearance, and glides over the surface of any object on which it may happen to rest, exactly in the manner of a slug, no separate motion of the body or legs being perceptible. The head is very small, and entirely concealed within the second segment; the body is formed like that of the familiar multivalve shell known as a *Chiton*, the divisions of the segments being clearly defined, and the posterior margin of each being curvilinear, and overlapping the anterior margin of the next succeeding segment; the dorsal surface is convex, and sprinkled with numerous extremely minute warts and slender bristles; the ventral surface is flat, the legs and claspers forming a medio-ventral double series, and each pair being closely approximate and far removed from the margin. The colour of the head is dingy green, with a few dark brown markings; of the body opaque apple-green, the warts being white and the bristles sienna-brown: in some specimens the green is interrupted by three stripes of a delicate purplish pink, one of them medio-dorsal, the others marginal. When full fed it attaches itself to the under side of the leaf or to a petiole, and undergoes its change to a chrysalis, which is obese and short; the body is particularly stout; the head rounded and without angles or ears; the anal extremity is also rounded and without points, the extreme tip incurved and furnished with minute hooks, by which it is attached to the web previously spun by the caterpillar; it is also fastened by a belt round the waist: the entire dorsal surface, and the abdominal portion of the ventral surface, are beset with short and stiff bristles, each of which is dilated at the extremity, and has the appearance of a stalked gland, similar to those which occur so commonly on plants: I do not find any of these processes on the cases of the antennæ, legs or wings, but they occur freely on every other part of the chrysalis. The colour is dull pale brown, approaching to putty-colour, and sprinkled or variegated with dark brown, approaching to black: these dark markings are grouped into a medio-dorsal series, almost forming a continuous stripe from the head to the anal extremity; they also form three lateral series of spots on each side; of these that series nearest the medio-dorsal stripe is

composed of very small spots, and is often indistinct, while the others are invariably distinct and strongly pronounced; similar spots occur on the ventral surface; the dark dots form oblique series on the wing-cases, and also on the cases of antennæ and legs.—*Newman.*

Obs.—At p. 41 of the third volume of the "Entomologist," Mr. Moncreaff says: "On the 17th December last, I found a number of the caterpillars of *Phlæas* feeding on dock and ragwort; they are now hybernating, and are very small. This proves that this species passes the winter in the caterpillar state."

Time of Appearance.—Throughout the summer and autumn. Mr. Wailes, in his "Catalogue," so often quoted, says—"Of this gay little butterfly there are broods in April, June, and September," and Mr. Dale took it at Wimborne as late as the 5th of November. It is very common at the end of September; I never recollect seeing so many together as on the 30th of September last at Elm Hall, Wanstead. A bed of verbenas seemed a great attraction to them.

Localities.—Mr. Birchall informs us that this pretty little butterfly is common in Ireland; Mrs. Battersby says it is very common at Cromlyn, and Mr. Fetherstonehaugh says it is abundant at Glenmore, Crossmolina. Mr. Birchall has taken it in the Isle of Man. Dr. Buchanan White says that in Scotland it has not been seen farther north than Inverness-shire; it is found both in the lowland and highland districts of Perthshire, but more commonly in the former; he has also taken it in Kirkcudbrightshire and Fifeshire. Mr. Campbell found it abundant at Millport. In England it is abundant, and generally diffused; but in the very complete lists from Cumberland and Westmoreland, kindly forwarded me by Mr. Hodgkinson, the name does not occur; it is, however, present in every other county list, and generally accompanied by such observations as "common," "very common," "abundant."

39. Pea-pod Argus.—The costal margin of the fore wings is slightly but regularly arched;

39. Pea-pod Argus (*Lampides bætica*). Upper side of Male and Female.

Under side.

the hind margin is also slightly arched. The hind wings are rounded, and have a long, slender, and somewhat twisted tail near the anal angle. This tail is continuous with the last of the longitudinal wing-rays, that nearest the inner margin of the wing. The colour of the upper side is dull pale smoke-colour, glossed with purple, lilac, or blue reflections. In the male these are spread very sparingly over the entire surface of the wings, but in the female they are concentrated, and form a large blotch on the fore wings, and cover the base of the hind wings: the blue blotch on the fore wings extends from the base to the middle of the wing, and occupies also the basal half of the inner margin, but does not reach either the costal or the hind margin; the blue surface seems to be due to the presence of numerous long hair-like scales of that colour. On the hind wings is a series of compound spots parallel with the hind margin. These spots are of different degrees of intensity—that nearest the anal angle is always distinct,

and the next following is still more so; the rest gradually decrease in distinctness, until almost obliterated towards the apex; they consist of a dark centre and pale circumscription. Above, and parallel with this series, there is frequently a very faint series of pale spots, sometimes of a crescentic form; but in many specimens these are scarcely discernible. The under side is dark brownish gray, with numerous transverse ashy gray markings, a series of which, in the form of crescents, runs parallel with the hind margin of all the wings; and on the hind wings this pale colour often assumes the form of a transverse bar between the hind margin and the middle of the wing. At the anal angle of the hind wing are two compound spots, which are black in the centre, and orange above, and their lower border is decorated with brilliant metallic green. Continuous with a wing-ray which passes between these two spots is the long slender tail already described.

Life History.—The last-disclosed females of this species lay their eggs on the twigs of the bladder senna (*Colutea arborescens*), but, like those of several, and perhaps all, the British species of this family, they do not hatch until the following summer, at which season the young pods of the senna are sufficiently advanced to serve as the food of the young caterpillar, which at first is almost black, and then feeds on the scarcely-formed pods; subsequently, it enters the pods through a nearly circular aperture, and devours the seeds; before attaining its full size it migrates frequently from pod to pod, only devouring the seed in the interior: it rests on the pods or on the twigs in a straight position, its shape scarcely allowing of any other. The head is very small, scarcely half so wide as the second segment, into which it is susceptible of being withdrawn, and thus entirely concealed: the body is shaped like a wood-louse, the dorsal area convex, the ventral area flat, and the incisions of the segments are very clearly marked. The colour of the head is black: the dorsal area of the body olive-green, reddish brown, or bright green; there is a dark, moderately wide, and perfectly continuous medio-dorsal stripe, extending from immediately behind the head to the anal extremity, and also a white lateral stripe below the spiracles, which are yellow; immediately above each spiracle, with the exception of the first and last, there originates a rather short line, which passes obliquely forwards and upwards towards the medio-dorsal stripe, but never unites with it; these oblique lines are longitudinally double throughout, the upper part being darker and the lower paler than the ground colour; the claspers are concolorous with the ventral area; the legs are brown. When full fed this caterpillar never remains within the bladder on the seeds of which it has fed, but (generally in the month of September) it escapes from the pod which had last served as its dwelling-place, and either descends among the dried leaves or attaches itself to a branch of the shrub, and in five or six days assumes the chrysalis state. The chrysalis is attached by a belt round the middle to the stem of the food-plant; it is obese, and rounded at both extremities; its colour is testaceous yellow or dull red, adorned with brown dots, which are particularly numerous about the crown of the head; there is also a continuous dark line in front, extending from the thorax to the anal segment; the spiracles are black, and plainly discernible with the naked eye. The caterpillar is infested by a minute ichneumon (*Microgaster glomeratus*), fourteen or fifteen of which frequently feed on a single caterpillar, and these, escaping through the skin of the butterfly-caterpillar, spin a cluster of little yellow cocoons, attaching them to the stalks or leaves of the food-plant—*Millière*.

Obs.—I have extracted the foregoing particulars from M. Millière's beautiful work, kindly lent me by Mr. Doubleday, from whom I obtain the additional information that the caterpillar is also found feeding in the pods of the field pea.

Time of Appearance.—In France this butterfly emerges from the chrysalis in September, and continues to fly throughout October. In this country it may occur in our pea fields now and then, but its existence must be very

precarious, because the egg would, in all probability, perish with the pea-haulm, which is rarely kept through the spring and early summer.

Localities.—From an examination of the long series in the British Museum, I find this insect, like *Pyrameis Cardui*, to be distributed over all parts of the habitable globe where agriculture has been introduced. In Britain it is evidently only a straggler: it has never been observed in Ireland, Scotland, or the Isle of Man, and I know of but three records of its occurrence in England.

Hampshire. One specimen was taken by Mr. Latour, near Christchurch, not many miles from Dorset, on the 4th of August, 1859—*J. C. Dale.*

Sussex. Two specimens have been taken at Brighton, on chalk downs facing the sea, by Mr. M'Arthur—the first on the 4th of August, 1859, the other on the 5th of the same month; I have seen both the specimens, and have no doubt whatever as to the species or the veracity of the captor. During the year 1859, in which these captures were made, the insect was very abundant in the Channel Islands and on the coast of France. I am indebted to Mr. Thorncroft for my first information of these captures.

40.—Silver-studded Blue (*Lycæna Ægon*). Male and Female. Upper side.

40. Silver-studded Blue.—On the upper side the colour of the male is purple-blue, shaded to black towards the hind margin; of the female smoky black, sometimes tinged with blue, and generally having a transverse series of orange-coloured spots, diversified in form, parallel with the hind margin. The under side is bluish gray, with seven black spots on the fore wings and eleven on the hind wings; all these spots have a pale circumscription; parallel with the hind margin of the hind wings is a series of seven orange-

Under side.

coloured spots, each of which is bordered above by a black crescent, and below by a silver-blue spot; immediately above this series the disk of the wing is of a pale gray; the fringe is white and unspotted.

Life History.—At page 241 of No. 58 of the "Entomologists' Monthly Magazine," dated March, 1869, Mr. Buckler has given a very complete "natural history" of this little butterfly. Trusting implicitly to his well-known accuracy, I have copied it entire. The eggs were procured by Mr. C. G. Barrett, who had induced a female to lay them on twigs of heather. "Considering the small size of this butterfly, the egg is rather large in proportion: it is white in colour, of a circular form, flattened and depressed in the centre both above and below, ribbed and beaded boldly at the sides, and from thence more finely by degrees to the centre. The egg does not change colour, but retains its pure dead-white appearance even after the exit of the caterpillar; a small hole, showing like a black spot on the side of the shell, alone betraying the escape of the little creature." In accordance with a suggestion of Mr. Doubleday, who had observed the female butterfly alighting on the common bird's-foot trefoil (*Ornithopus perpusillus*), Mr. Buckler offered the young caterpillars that plant for food, and found it so acceptable to them, that he considers there is little doubt of its being the natural food of the species. "When first hatched, the caterpillar is about three-fourths of a line long, thick in propor-

tion, of equal bulk, and rounded at either end, hairy, and of a dull bluish-green colour, its powers of locomotion of the very feeblest description. By the 3rd of May they had become rather more than a line in length and of a drab colour, and hairy like the leaflets on which they were feeding. By the 29th of May they had grown to about a quarter to three-eighths of an inch in length, eating, not through the leaflets, but only the green cuticle. At this time they were of a deep yellowish gray, and the dorsal stripe blackish olive, edged with whitish, and a whitish stripe along the lateral ridge above the legs; the sub-dorsal stripe being triple, *i.e.*, two lines of blackish-olive with a whitish-gray one between them; the surface generally studded with minute blackish points, each bearing a fine short hair. From the 11th to the 15th of June they had all assumed their last coats. The full-grown caterpillar is about seven lines long, thick in proportion, and of the usual oniseiform or *Lycæna* shape. The head is small, and retracted when at rest or alarmed, the second segment the longest, rounded, and very slightly flattened above; the others as far as the tenth have raised prominences on each side of the back, and a dorsal hollow between them, the sides sloping to the lateral ridge; the ventral surface is rather flattened; the legs all placed well underneath. The last three segments are without dorsal ridges, and slope gradually to the sides and anal extremity; their sides are rather concave, and there is a very prominent wart on each side of the twelfth; the segmental divisions are not observable on these last, but are well cut on all the others. In colour the caterpillar is now a bright yellow-green, with the dorsal stripe blackish-brown, edged with whitish from the beginning of the third to end of the tenth segment; it is widest on the third and fourth, being on them of a rather rounded lozenge form, with a whitish dot near the edge on each side; there is a dull dark brown small plate in front of the second segment, and a broad semi-lunar-shaped blotch of the same colour a little behind, and divided in the middle by a fine line of the green ground-colour. The dorsal stripe on the eleventh segment becomes broad and squarish, but resumes its linear shape on the twelfth and thirteenth. The sub-dorsal stripe is visible from the beginning of the third to the end of the eleventh segment as a greenish-yellow line running between two green ones darker than the ground-colour. At the bottom of the sides along the lateral ridge, commencing on the third segment, and continued round the anal extremity, is a whitish line. Between the dorsal and sub-dorsal stripes, on all the segments from the third to the tenth both inclusive, are faintly paler oblique lines of yellow-green, viz., one on each segment sloping downwards and backwards; the warts on the twelfth segment are very often suddenly projected considerably, and then a circle of fine short hairs is visible on their extremities. The surface of the body is also clothed with similar hairs; the head is black, having the base of papillæ and a streak across over the mouth of buff colour. They had all turned to chrysalids by the 24th of June, one of them slightly attached to a stem of the plant by the anal extremity, and lying, like the others, amongst a few loose threads at the very bottom of the stems, and partly in the earth. The CHRYSALIS is about five lines long, smooth but without polish, the top of the head slightly projecting, the thorax rounded, the body plump, curving on the back outwards and backwards towards the tip, which is hidden in the caterpillar skin; the wing-cases are prominent and long in proportion; it is of a dull green tint, with a dark brown dorsal line of arrow-head marks."—*Buckler*.

TIME OF APPEARANCE.—From the beginning to the third week in July.

LOCALITIES.—It seems to be one of those species which, from their inconspicuous character, are very likely to be overlooked; and hence its range is very imperfectly ascertained. I have repeatedly taken it in Herefordshire when eager to net every blue, in the hope of securing *Acis*, and have thus obtained a knowledge of its presence. In Ireland it is reported by Mr. Birchall from the Murrough of Wicklow, and from near Ross Trevor. My correspondents resident in Ireland have not

mentioned it. It has not been reported from the Isle of Man, but has been taken in Scotland. Dr. Buchanan White says it has been taken once, by Mr. D. P. Morison, near Pitlochrie in Perthshire. In England its range is extensive, but, apparently from the cause above stated, capricious.

Cambridgeshire. It occurs in several places —*F. Bond.*

Cheshire. Delamere Forest—*Noah Greening.*

Devonshire. Torquay, Teignmouth, Bovey Tracy, and Axminster—*J. J. Reading.*

Dorsetshire. Parley Heath in plenty, Blandford race-course, Portland amongst rocks—there is no heath near—*J. C. Dale.*

Durham. Very common at Darlington—*J. Sang.*

Essex. Very common on a piece of dry ground along the side of the road near High Beech—*W. J. Argent;* the late Edward Doubleday, R. Mendola, and many others have taken *Ægon* at this place.

Glamorganshire. Scarce at Llantrissant—*Evan John.*

Gloucestershire. Rare at Clifton—*A. E. Hudd.*

Hampshire. Portsdown — *W. Buckler;* New Forest—*F. Bond;* Woolmer Forest—*C. G. Barrett;* common but local about Ringwood—*G. B. Corbin;* Sheep Wash, near Petersfield—*Henry Moncreaff.*

Herefordshire. Ascent of the Black Mountain and elsewhere—*E. Newman.*

Huntingdon. Monk's Wood and other woods—*F. Bond.*

Kent. Tunbridge Wells Common, tolerably plentiful—*G. H. Raynor;* swarming near Frant Forest, Tunbridge Wells—*H. Ramsay Cox;* Darent and Birch Woods—*W. Machin;* abundant on all the chalk downs of the coast District—*W. O. Hammond.*

Lancashire. Near Manchester—*R. S. Edleston;* common on Chat Moss, South Lancashire. It used formerly to occur on Solwick Moss, near Preston—*J. B. Hodgkinson.*

Lincolnshire. Occurs in the county—*T. H. Allis.*

Middlesex. Scratch Wood—*F. Bond.*

Monmouthshire. Common at Castle-y-Bwch —*George Lock.*

Norfolk. Stratton Strawless—*C. G. Barrett.*

Northamptonshire. Barnwell Wold—*F. Bond;* near Towcester—*Hamlet Clark.*

Somersetshire. Brockley, &c.—*A. E. Hudd.*

Staffordshire. Very rare at Wolverhampton —*F. E. Morris.*

Suffolk. Hemingfleet Heath — *W. M. Crowfoot;* Sudbury—*W. D. King.*

Surrey. Hindhead, Witley, Milford—*C. G. Barrett.*

Sussex. Rogate Common—*W. Buckler.*

Warwickshire. Coleshill Park and neighbourhood; also Sutton Park — *F. Enoek;* Rugby—*G. B. Longstaff.*

Westmoreland. Witherslack, Faraway Moss —*J. B. Hodgkinson.*

Wight, Isle of. Hampstead, near Yarmouth—*F. Bond;* Newport—*Alfred Owen;* taken in marshy places in the island; perhaps common, but local—*James Pristo.*

Obs.—As in the instance of the Marsh Ringlet, at page 97, a preliminary note seems desirable in introducing the butterfly which stands next on my list. To this butterfly the names of *Medon*, *Agestis*, *Idas*, *Artaxerxes*, and *Salmacis*, have been successively applied: the first, second, and third of these names appear to be strictly synonymous; the fourth and fifth were given under the apprehension that the phases or races so named were specifically distinct, not only from that which was originally named *Medon*, but also from each other. At the risk of being considered tedious I will enter a little more into detail. *First*, the butterfly figured by Esper as *Medon*, in 1777, appears identical with that figured by Lewin as *Idas*, in 1795; and I believe that the figure of *Agestis* in Hubner represents the same insect. This, which I take as the type, is almost ubiquitous in Great Britain. *Secondly*, the *Hesperia Artaxerxes* of Fabricius is identical with the *Papilio Artaxerxes* of Lewin and Haworth, and is a Scotch insect very different in appearance from *Medon*. And, *thirdly*, the *Polyommatus Salmacis* of Stephens, a butterfly

which seemed to combine the characters of the other two, and its geographical position, the county of Durham, was intermediate between them. Until the publication of this third species, or supposed species, no doubt appears to have been expressed of the distinctness of the other two. But when a new species of insect is discovered, which in its general characters is intermediate between two old ones in coloration, ornamentation, and geographical position, an opinion — perhaps I should say, a suspicion — will arise that the intermediate species connects the other two, and that the three constitute but a single species. I scarcely know whether such an opinion was immediately made public, but still the question appears to have been discussed, since Mr. Wailes, a gentleman of profound observation and research, believed it incumbent on him to defend the newly-proposed species, which he did at page 42 of the first volume of the "Entomological Magazine," in these words:—"*Polyommatus Salmacis.*—I entirely coincide with Mr. Stephens in considering this a distinct species." This opinion, or rather decision, was received with great deference, and was justly regarded as one of importance, since it must be evident that the existence of a distinct species intermediate between two other species was an *a priori* argument in favour of the perfect distinctness of those other species. Mr. Dale was, I believe, the first entomologist who expressed a decided opinion adverse to the claims of *Salmacis* as a distinct species. At page 357 of the first volume of the "Entomological Magazine," Mr. Dale writes thus:—"*P. Salmacis*, or *Titus*, is intermediate between *Agestis* and *Artaxerxes*; in Scotland none of the *Agestis* are to be found, they are all *Artaxerxes*; in the south none of the *Artaxerxes* are to be found, they are all *Agestis*. At Newcastle they appear to be mules, or hybrids between the two species, partaking in some degree of the characters of both; some of the varieties have a black spot inside the white one on the upper surface of the first wings." This was published in 1832: and in the January of 1834, after having devoted much time and attention to Mr. Dale's opinion, as expressed above, I published an opinion of my own, which went perhaps rather further than Mr. Dale's in the same direction. I stated, that "having examined specimens of *Polyommatus Agestis* from different localities, I have arrived at a conclusion which will not, I fear, be coincided in by many of our lepidopterists. On the south downs of Sussex and Kent *Agestis* assumes what may be called its typical form. I have taken it at Ramsgate, Dover, Hythe, Hastings, Rye, Brighton, Worthing, Littlehampton, Chichester, and Portsmouth; in the Isle of Wight, in Dorsetshire, and in Somersetshire; and throughout this range it is very similar: then, going northwards, I have met with it at Worcester, Leominster, Birmingham, and Shrewsbury—and here an evident change has taken place: the band of rust-coloured spots has become less bright: at Manchester these spots have left the upper wing almost entirely: at Castle Eden Dene they are scarcely to be traced, and a black spot in the centre of the upper wing becomes fringed with white; in some specimens it is quite white, as shown at page 126: it then changes its name to *Salmacis*. We proceed farther northwards, and the black pupil leaves the eyes on the under side, until at Edinburgh they are quite gone; then it is called *Artaxerxes*. The conclusion I arrive at is this: that *Medon*, *Salmacis*, and *Artaxerxes* are nothing more than geographical races of one species." Mr. Wailes, in his admirable "Catalogue of the Lepidoptera of Northumberland and Durham," seems to think this conclusion erroneous, for he says "Mr. Newman, in the second volume of the 'Entomological Magazine,' advanced an opinion that all three were one, though I certainly think on insufficient grounds."—P. 217. Mr. Wailes then goes very carefully over the ground, and after five pages of lucid and elaborate reasoning, he arrives at the following conclusion:—"From all these facts and circumstances I think I am justified in uniting the three forms under the single name of *Medon*."—P. 223. Thus Mr. Wailes seems to retract his original opinion, and to arrive at the same terminus as myself, by a line of his own construction—an issue

of the inquiry peculiarly agreeable to me, because it evinces perfect independence of thought. At page 57 of the "Annual Report and Transactions of the Plymouth Institution," Mr. Reading, the eminent Plymouth naturalist, after considering the question in all its bearings, disposes of it thus:—"A careful comparison of the forms of the imago long since convinced me that *Lycæna Medon*, *Salmacis*, and *Artaxerxes* were forms of one species." My own opinion as originally expressed remains unaltered, but I conceive that such an opinion by no means dispenses with the necessity of distinguishing the three phases as clearly as I am able. I shall, therefore, describe each phase, race, or variety separately, as I have done in the case of *Darus* and *Rothliebii*, being satisfied that I have done my duty in expressing without urging my opinion, that the three phases constitute but a single species.

The upper figure represents *Medon*, the second *Salmacis* (male), and the lower *Artaxerxes*.

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41. Brown Argus.—All the wings are dark sepia-brown on the upper side, the fore wings having a median, linear, transverse, obscure, discoidal black spot, and all the wings having a series of orange-brown spots parallel with the hind margin; the fringe is spotted. The under side is slatey-gray in the males, fulvous-brown in the females, with seven black spots in the fore wings and eleven in the hind wings, all of them having a white circumscription; there is also a series of orange-red spots parallel with the hind margin of all the wings. Each of these is connected with a crescentic black spot above and an amorphous black spot below; it is also enclosed in an imperfectly-defined white circumscription; below the middle of the wing, and extending towards the hind-marginal series of compound spots, is a vague and indistinctly-defined sub-median white blotch.

Obs.—The specific name of *Medon* for the Brown Argus was given by Hufnagel in 1774, and has been adopted by Esper and continental entomologists generally, but not by our countryman Lewin, who believed it identical with the *Papilio Idas* of Linnæus, nor by Haworth, who calls it *Idas*, although perfectly aware that the *Idas* of Linnæus was the female of the Common Blue. Mr. Stephens changed the name to *Agestis*, evidently on the supposed ground of priority; but I think this also a mistake, and revert to the earliest name.

Life History.—At page 6211 of the "Zoologist" for 1858, Mr. H. J. Harding says:—"I discovered the caterpillar of *Medon* about eight years ago, and have taken it every year when on the Deal coast. . . . It is found on and under the hemlock storksbill (*Erodium cicutarium*), which grows here in large patches or beds in many places apart from other herbage; and it is from this cause that the caterpillars are so easily found: having no legs, like many other caterpillars, they cannot feed on the tops, but on pulling aside the branches of the storksbill, the caterpillars are found on the sand beneath them." Having received some of the caterpillars in question, and others having been sent to Mr. Logan, I believe we both immediately arrived at the conclusion that they were the caterpillars of a beetle. Such was certainly the case in some instances, as fully established by rearing the perfect beetle from them, both in Edinburgh and in London; and such an inference might fairly be drawn from Mr. Harding's description, "having no legs." The truth of

the theory was abundantly proved by the sequel, for the caterpillars produced a beautiful weevil (*Hypera fasciculata*); nevertheless, I am quite prepared to admit that the caterpillars of *Medon* were probably present in company with those of the weevil, and that Mr. Harding piloted the way to the discovery of the life history of this species. The reader who feels an interest in this question, and has leisure to do so, is recommended to read the controversy on this subject in the volume of the "Zoologist" from which I have already quoted, pp. 6211, 6246, 6248, 6270, 6277, 6278, and 6310. In quoting Professor Zeller's account of this insect, from page 73 of No. 40 of the "Entomologists' Monthly Magazine," I would invite attention to the fact that this truly eminent entomologist was on the very eve of repeating Mr. Harding's mistake as to the caterpillar of a beetle. "After several attempts, which I made in the beginning of the summer of last year, to observe the female whilst ovipositing, and which, from the state of the weather, were always fruitless, I at last succeeded on the 22nd of August. A female settled on a fallow field on the bare ground. Having observed in her vicinity some seedling plants of the storksbill, I did not disturb her; consequently, I saw how she approached towards one of these plants, and, after a short rest, curved her abdomen, and deposited an egg on the under side of a leaf; having done this, she flew away. This EGG had the ordinary form of those of the genus *Lycæna;* it was greenish-white, and retained this colour till the 31st August, when it became pure white, and had on its upper side a large kidney-shaped hole, through which the caterpillar had escaped. The plant with the egg I had fastened with a pin to a larger plant in a flower-pot, so that it should not dry up. Suspecting that more eggs had probably been deposited in the same locality, I revisited the place on the 5th September, and cut off about a hundred plants (which were now rather larger) close above the roots, without shaking them, and placed them in a pocket-handkerchief. On the following day, when they were becoming rather withered, I shook them out, and, in addition to sundry green aphides, and some caterpillars and chrysalids of *Syrphus*, I obtained eighteen onisciform caterpillars. These were from one to two lines long, dull pale greenish, with rather long white hairs, the lateral margins rather paler, the head black. They remained half an hour or longer before they crawled away from the spot where I had placed them; they repaired to the under side of the leaves, and ate during the sunshine the tips of the primate leaves, leaving only the upper skin remaining, which soon curled up and withered. On the 11th September, I tried the same plan of operations on a sunny slope, where the butterfly had not been scarce in the spring. Here I found what I took for the full-grown caterpillar, only I was struck by its shape being so slightly onisciform, since the body was narrow and gradually attenuated behind. The largest were pale green, with the head honey-yellow, spotted with black; a pale rose-coloured dorsal stripe on each segment, an elongate black spot on each side; beneath the black spiracles ran a wavy pale red longitudinal stripe; the prothorax was yellowish. Yet I supposed this to be the *Medon* caterpillar I was seeking, till I observed the following day that it had no anterior legs: I believe it was the caterpillar of one of the *Curculionidæ*. As they were eating up my food unnecessarily, and I did not feel certain that they might not be disposed to make a meal of one of my true *Medon* caterpillars, I turned them away altogether. I had, however, amongst them truly obtained some caterpillars of *Medon*. By a third expedition I increased my stock to more than fifty, so that now there seemed good hopes of bringing some safely through the perils of winter. I distributed them into three flower-pots; but I had great difficulty with the food-plants, since the young plants died quite as soon as the old ones planted with injured roots. At the same time, the caterpillars grew very slowly; however, by degrees, they assumed the colouring and markings of the adult caterpillar. Early in December, when frost set in, I arranged the three flower-pots for the winter: two, covered with gauze, were

placed outside a window facing north, and the other, quite uncovered, stood in a cold room. From time to time I watered the plants to keep them alive. On the 14th February I searched for the caterpillars which had survived the winter, in order to put them again in the sunshine. In the flower-pots which had been exposed to the open air I found both the plants and caterpillars dead; in the third flower-pot I found fifteen caterpillars of rather different sizes: they had remained motionless the whole time, either on the stems of grass, or on or under living leaves of storksbill. As I had not spared anything necessary for their rearing, I come to the conclusion that the reason the females are so fruitful in autumn is that many caterpillars may be destroyed during the winter without injury to the species; and that this is truly the case seems to be shown from the fact, that the multitude of caterpillars which are to be found in autumn does not at all correspond to the number of butterflies of *Medon* which appear in spring. Supplied with fresh food, which would probably suit their taste, in the sunny window, my caterpillars cast their skins several times. Although I could not make any precise observations, yet it is certain that the number of moultings does not differ from what occurs in other species of *Lycæna*. Of the fifteen caterpillars, seven died by degrees. One, just dead, which I described on the 14th March, was already nearly five lines long. Its shining black head had a gray face; the body was pale green, with a deep, rather narrow, posteriorly attenuated, dark red medio-dorsal stripe. The warts near it on each segment, with about twelve unequally long, pointed, pale bristles, which, on the anterior segments, stand almost perpendicularly, on the middle and hinder segments are directed more backwards. I could not perceive that these caterpillars had a cone capable of being protruded (like that which we find in *Lycæna Corydon*, and which the ants are so fond of licking). The legs are black; the claspers of the same colour as the pale belly, which, on each segment from the fourth, has on each side a black streak reaching to the lateral wart; these streaks, however, are not perceptible in the living caterpillar. The red lateral stripe is as usual. Having planted three vigorous plants, the remaining caterpillars prospered so well that, by the 8th April, I could look upon them as full grown, or nearly. They devoured the primate leaves, gnawed the stem of the leaf, hence causing the upper part to wither, and did not spare the young shoots, when the plants assumed at last a very injured appearance, and were abundantly sprinkled with grains of brown-green excrement. The caterpillars crawl very slowly, whilst they spin a white thread, which they fasten to the right and left, and on which they fix their legs. They are not easily seen on the food-plant, since they are the same shade of green, and even their bristles have the same colour as the hairs on the leaf-stalk.

"The full-grown CATERPILLAR is six lines and a half in length. Its body is much arched, and so contractile that the creature can appear a line and a half shorter, whereby it naturally becomes more deeply arched. The retractile black head has a whitish transverse streak above the mouth; the dark palpi are whitish at the base. The ground colour of the body is an agreeable pale green; the deeply-seated, brownish-purple coloured medio-dorsal stripe reaches from the beginning of the mesothorax to the beginning of the penultimate segment; the rather flat anal plate is semi-oval, and in the middle of each side slightly concave. On each side of the body from above, obliquely downwards and backwards, are faint pale stripes, only just perceptible, and in many points of view quite invisible. The incisions of the segments are deep above, whereby on each segment near the dorsal line an eminence arises, which bears a multitude of white bristles of unequal length, almost radiating. Below this wart-like eminence is a second, less conspicuous, with similar bristles. Both eminences have hollows in the middle, which the caterpillar can raise or depress at will. The lateral wart, clothed with longer projecting bristles, in which the spiracle is not perceptible, is purple-red, and forms the rather

broad lateral stripe, which, however, does not reach the head, since the prothorax is either altogether green at the sides, or is only pale reddish posteriorly. The anal plate is purple-coloured only for a narrow space anteriorly at the sides. The belly is pale green, with many whitish bristles. The claspers are short, pale yellowish, rather transparent, with short cylindrical feet, with a darker yellowish circlet of hooks; the legs are spotted with black anteriorly. When the time of pupation approaches, the caterpillar becomes of a paler green, and crawls about restlessly to seek a place for spinning. As I once lost the caterpillars of *Lycæna Amyntas* at this period of their lives, because they could find no place suitable for their change, I laid crumpled paper, gauze, dry elm and poplar leaves, and old stalks of wormwood, amongst the plants of storksbill. As, however, with the caterpillar which first became restless all this appeared of no avail, I shut up the two most bleached and shrunk in a small wooden box, in which both gauze and paper lay. Here, after five or six days, they became quiet, and changed to chrysalids without spinning. The others in the flower-pot changed on the earth, nearly free. I had almost come to the conclusion that spinning in *Medon* is altogether omitted; however, two spun up quite in the usual *Lycæna* style, on a white silken web, and with a thread round the body; one of these was in the cavity of an old elm leaf, the other on a willow leaf, between stems of *Artemisia*, which it had drawn together with some transverse threads, forming as it were the rudiments of a cocoon. By the 28th of April all the eight had assumed the chrysalis state. Out of doors the caterpillars, owing to the hitherto inclement weather, were certainly not so far advanced. The CHRYSALIS has the usual *Lycæna* form, is from four to five lines long, the males smaller and more slender than the females, naked, only at the head and on the upper part of the back with isolated, very short whitish bristles, only perceptible with the aid of a lens; the colour is a rather transparent pale amber, more or less greenish, with slight lustre: the opaque body is more of a pale yellow. Over the eye is a short, curved, shining black line. The convex thorax is separated from the equally convex back of the body by a saddle-like depression. The body has a dorsal stripe of reddish-purple, more or less brilliant, and a similar lateral stripe of different breadth, which also shows through the upper margin of the wing-cover. The anal extremity, which is concealed in the empty skin of the caterpillar, is obtuse, rounded, and without spines or bristles. It is immovable, and is held fast by a fine white thread, which is drawn round the base of the body, and by the exuvia, on its silken couch. The exclusion of the butterfly takes place according to the temperature, in from two to three weeks."—*Zeller*.

TIME OF APPEARANCE.—The butterfly appears twice in the year, in May and August.

LOCALITIES.—Mr. Birchall informs us that this species is taken at Dundrum, near Dublin; there is no record of its occurrence in the Isle of Man or in Scotland. In England it is widely, and, I may say, generally distributed, but does not occur in the lists transmitted me from Berkshire, Cumberland, Cheshire, Middlesex, or Shropshire.

Castle Eden Argus (*Lycæna Salmacis*). Female.

CASTLE EDEN ARGUS.—"Wings brown-black; beneath brownish, with subocellated spots: fore wings above with a discoidal black spot in the male, a white spot in the female: hind wings with a red sub-marginal band on both sides."—*Stephens*.

Obs.—Having already expressed my opinion as to the insect not having a claim to be ranked as a species, and feeling quite incompetent to differentiate this supposed species from those which immediately precede and follow it, I hold myself excused from writing a description from nature, and adopt without alteration that published by my late lamented

friend. The original specimens, six in number, from which the descriptions were made, are in the British Museum; five of them have no discoidal white spot; one has the white spot decided and distinct; four have an indistinct discoidal linear black spot; all have an indication of a series of orange spots parallel with the hind margin; in one specimen this series is complete on all the wings; the only specimen showing the under side has a black pupil in all the white spots.

Life History.—Unknown.

Time of Appearance.—One brood only; the butterfly on the wing from the latter end of June to the latter end of July.

Locality.—Castle Eden Dene, in the county of Durham. This species appears confined to the sea banks, and I have never seen it above half a mile from the coast, and only stragglers at that distance.—*George Wailes.*

Scotch Brown Argus (*Lycæna Artaxerxes*).

Scotch Brown Argus.—All the wings dark sepia-brown on the upper side, with a white discoidal spot on the upper wings, and an indication of a series of rust-coloured spots parallel with the hind margin of the hind wings; the fringe is spotted. The under side is slatey-gray in the males, fulvous-gray in the females: in both sexes there are seven white spots on the fore wings, and eleven on the hind wings: there is also a series of reddish spots parallel with the hind margin of all the wings, each of which is connected with a crescentic black spot above and an amorphous black spot below: between the middle of the wing and the hind-marginal series of compound spots is a sub-median white blotch, often amalgamated with other white spots.

Variety.—With a white discoidal spot on upper side of each hind wing.

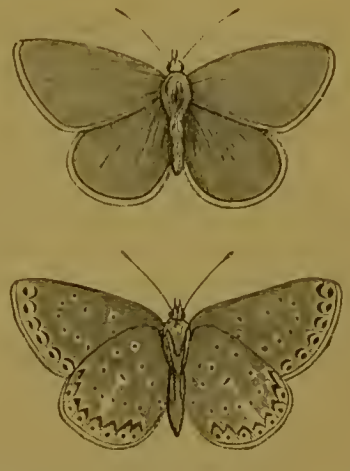
Life History.—Mr. Young, of Edinburgh, describes the eggs of *Artaxerxes* as circular, flattened, covered with small granulations, except at the apex, and of a greenish white colour: they hatched in fourteen days, and the young caterpillars were very delicate, of a semi-transparent white colour, with a black head, and numerous long white hairs: they preferred the leaves of the scarlet geranium to those of the sun cistus. Mr. Logan, Mr. Buckler, and Professor Zeller, have given lengthened descriptions of the caterpillar in a more advanced state. I select Mr. Buckler's, which is written from specimens sent him by Mr. Doubleday, and is published at page 176 of No. 55 of the "Entomologists' Monthly Magazine." "The caterpillar," says Mr. Buckler, "is of the usual *Lycæna* shape, somewhat onisciform, short and thick, being arched on the back and sloping on the sides; the spiracular region is swollen, and projecting laterally much beyond the claspers; the segments appear deeply divided, especially on the back, down which are two rows of rather peaked cone-like eminences, with a dorsal hollow between them; the second segment is simply rounded above, and rather longer than the others, and tapering a little near the head, which is very small and retractile; the anal segment tapers very little, is rounded behind, and hollowed above on the sides; the twelfth segment has a small and prominent wart on each side. The half-grown caterpillar is from three to four lines in length, pale green in colour, and clothed with very fine and short whitish bristles; the mediodorsal stripe, beginning on the fourth and ending on the twelfth segment, is of a faint brown colour, though wider and more strongly marked just at the beginning of each segment, and widest at its termination on the penultimate. On the sides of the segments, from the fifth to the tenth, are double oblique lines, slanting backwards and downwards, of paler green in front and darker green behind than that of the ground colour. At this stage of growth the natural projecting ridge of swellings is broadly pink, with scarcely an indication of a central paler stripe; the belly and ventral claspers are pale yellowish green; the legs flesh colour. The head is black, the base of the papillæ flesh-colour, and there is a streak of the same before the mouth. On approaching full growth its length is about half an inch; the oblique lines gradually disappear, and the green colour becomes rather darker; a pinkish white stripe runs along the natural

prominences, broadly bordered above by a stripe of rose-pink, and beneath by a broader stripe of still darker pink; the spiracles are flesh-colour, situated in the upper pink stripe, very minute and inconspicuous. The claspers are green, and the legs pinkish, spotted with brown. These caterpillars were fed on the common sun-cistus (*Helianthemum vulgare*), and two of them changed to the chrysalis state on the 21st of May, and a third a week later, all in nearly perpendicular positions, amongst and slightly attached to the stems of the food-plant by a few silk threads near the ground. The CHRYSALIS is about four lines in length, smooth, and without polish, rather thick in proportion; the head rounded and prominent; the thorax rounded above, the body plump, and curved a little backwards; its extremity being hidden in the shrivelled skin of the caterpillar, which adheres to it: the colour of the head and wing-cases is blue-green, with a black curved streak obliquely placed on each side of the head; the body is yellowish flesh-colour, with a deep pink stripe at the sides enclosing a central white one, which can also be seen showing through part of the wing covers."—*Buckler*.

TIME OF APPEARANCE.—In 1858, on the 19th of June; in 1859, on the 27th of June; in 1860, on the 30th of June; in 1864, on the 13th of June; in 1865, on the 1st of July; in 1867, on the 27th of June.—*F. Buchanan White*.

LOCALITIES.—Unknown in Ireland, England, or the Isle of Man: in Scotland it is generally distributed. Dr. Buchanan White says it occurs everywhere in Perthshire where the sun-cistus grows. Even in Rannoch, where the plant is scarce, he saw specimens of the butterfly. It has been recorded from as far north as Aberdeenshire. Dr. Syme says it is local but abundant on Orrock Hill, and has occurred in other places near Balmuto. I have seen it in some abundance on Arthur's Seat, near Edinburgh, which is the original locality. Mr. Birchall finds it in Ayrshire.

42. COMMON BLUE.—The upper side of all the wings is delicate lilac blue in the males; dingy brown, more or less glossed with lilac blue reflections, in the females, and having a



42. Common Blue (*Lycæna Icarus*). Upper and Under sides.

more or less indistinct series of orange spots parallel with the hind margin; in this sex there is also a transversely linear, but indistinct, black discoidal spot on the fore wings; the fringe is white. The under side of all the wings is ashy-gray in the males, fulvous-brown in the females: in both sexes there is a hind-marginal series of compound spots, which are rather indistinct in the males, but very distinct in the females; the marginal portion of each spot is white, and contains a transverse black mark; then follows an orange blotch, then a black crescent, and then a white crescent: the disk of each fore wing

Two Varieties of the Under side in the cabinet of Mr. Bond.

has nine, and that of each hind wing thirteen, black spots, each spot having a white circum-

scription; below the middle of the wing, and extending towards the hind-marginal series of compound spots, is a vague and indistinct submedian white blotch.

Varieties.—The varieties of the upper side are rather puzzling, owing to the greater or less preponderance of the blue tint in the females; the males, on the contrary, are almost uniformly blue. The under side is subject to occasional variation, owing to the combination and enlargement of the spots. Two beautiful specimens, illustrating this peculiarity, have been kindly lent me by Mr. Bond purposely for this work, and are figured on the preceding page.

Obs.—The specific name of *Icarus* for the Common Blue dates 1774, and has been adopted by Esper, and by our countrymen Lewin and Haworth. Modern English nomenclature has changed the name to *Alexis*, but I think without sufficient reason, although this also is an early name, having been proposed in 1776.

Life History.—The eggs are laid on rest-harrow (*Ononis spinosa*), and the young caterpillars, when they emerge, feed on the leaves of this plant, on which they may be found resting much after the manner of a *Chiton*, a shell which in form they somewhat resemble. The head is very small, glabrous, oblong, porrected in crawling, but otherwise withdrawn into the second segment and totally concealed; the body is convex above, flattened below, rounded at both extremities, and dilated and lobed at the sides; the divisions of the segments are conspicuously marked; the spiracles are situated considerably above the lateral margin, so much so that they might be called sub-dorsal; the posterior pair are decidedly dorsal; the whole surface is covered with extremely minute warts, each of which emits a hair. The colour of the head is intensely black, of the body green—sometimes bright apple-green, at other times dull olive-green; there is a medio-dorsal stripe rather darker, and a narrow lateral stripe below the spiracles, but above the lateral lobes, much paler, almost white; between the dorsal and lateral stripes there are, on each side of each segment, three pale oblique lines, their inclination being from the anterior to the posterior margin of the segment; the minute warts are black; the legs, claspers, and ventral surface are of the same green hue as the body. Towards the end of July it undergoes the transformation to a chrysalis, which is rounded at both extremities, and is without angles; the anal extremity is without the usual minute hooks for attachment; the region about the head is furnished with minute bristles; the colour is dull green; the head, extremity of wing-cases, and ventral surface of abdomen are tinged with brown.—*Newman.*

Time of Appearance.— Throughout the summer from May to October, perhaps more particularly abundant in May and June.

Localities.—Mr. Birchall says it is common everywhere in Ireland; he also reports it from the Isle of Man. In Scotland it is particularly large and brilliant. The specimens brought from Rannoch by Mr. Thomas Edle are the largest I have ever seen; so intense is the blue of the males, that I could not avoid thinking it was another species, but Mr. Doubleday pronounces it identical with our English species. Dr. Buchanan White says that its range in Scotland extends from the sea-level up to a considerable elevation in the mountains. In England it is everywhere, except in a few localities in Yorkshire: I believe it has escaped the notice of the Halifax entomologists.

43. Clifden Blue (*Lycæna Adonis*). Upper side of Male.

43. Clifden Blue.—On the upper side all the wings of the male are of the most beautiful shining blue, with a slender white line on the costal margin of the fore wings, and a slender black line on the hind margin; this black line passes round the tip of the wing beneath the white line, but vanishes at about half the

length of the costa. The wing-rays are black towards the hind margin; the fringe is snowy white, with a black spot opposite the end of every wing-ray—that is, five in the fore wings and seven in the hind wings. The upper side in the female is smoky brown, occasionally with blue reflections, and having a series of spots, more or less distinct, parallel with the hind margin; these spots have a somewhat compound character, the upper border being orange, the centre black, and the lower border white; on the fore wings is a transverse linear discoidal spot, black with whitish margin, but always faint and indistinct. The under side is grayish brown in both sexes; all the wings have a transverse median discoidal spot in the fore wings; this is black with white circumscription; in the hind wings it is white, with a very slender black median line; on the fore wings are nine other black spots, and on the hind wings eleven, all of which have a white circumscription; there is also a series of compound spots parallel with the hind margin; the centre of each is orange, with a black mark above and below the orange, and a white circumscription; a submedian shapeless white blotch extends from near the middle of the hind wing nearly to its hind margin.

Life History. — Fabricius describes the caterpillar as of a green colour, and as having dorsal series of fulvous spots. Freyer somewhat improves this brief description, by fixing the number of spots at twelve in each series, of which there are two; and adds that there is a yellow stripe on each side. It feeds on leguminous plants. I regret my inability to give any more information respecting an insect that is in every collection.

Time of Appearance.—I have never found the caterpillar or chrysalis. The perfect insect is on the wing in May or June.

Localities.—Unknown in Ireland, Scotland, or the Isle of Man. In England it is a southern species, and almost peculiar to the chalk. I give a few localities.

Buckinghamshire. Drayton Beauchamp—*H. H. Crewe;* Halton—*Joseph Greene.*

Devonshire. On the chalk and limestone formations, but not in the Plymouth district; Torquay; common at Chapel Hill and Anstey's Cove; Seaton; Sidmouth—*J. J. Reading.*

Dorsetshire. Knowle Hill, Buckland Newton, Portland, Lulworth, Blandford Racecourse—*J. C. Dale.*

Gloucestershire. Scarce at Wootton-under-Edge, but occurred there in 1861, 1865, and 1869—*V. R. Perkins;* taken in the gully at Durdham Downs in 1868, but not reported since—*W. H Grigg;* Clifton — *Alfred E. Hudd.*

Hampshire. Near Winchester—*J. C. Dale.*

Kent. In profusion about Dover Castle and all the hollows at Folkestone—*H. Ramsay Cox;* not uncommon—*G. H. Raynor;* Chilham Park and Dane Court, near Chilham—*H. A. Stowell;* in chalky lanes and railway cuttings, local but abundant—*W. O. Hammond;* lane leading from Dartford to Darenth —thousands have been taken in this and some neighbouring localities for the unworthy purpose of making butterfly pictures — *E. Newman.*

Surrey. Abundant at Mickleham, and on the chalk downs about Guildford, and on the south side of the Hog's Back—*E. Newman.*

Sussex. Malling Hill, Bible Bottom, East Dean, &c., abundant—*E. Jenner;* Hollingbury Coombe—*W. Buckler;* Beeching Chalkpit at end of May, and again in August, plentifully—*J. H. White;* plentiful near Lewes, on chalk —*C. V. C. Levett;* downs near Brighton—*W. H. Draper.*

Wight, Isle of. Ventnor, Apse Down, Freshwater, generally distributed on the downs—*F. Bond;* common in places on the chalk, as near Carisbrook Castle, &c.—*J. Pristo;* St. Boniface Down—*J. C. Dale.*

44. Chalk-hill Blue.—In the male the wings are of a pale silvery blue, gradually shading off to smoky black towards the hind margin, where the black forms a hind-marginal band in the fore wings; there is a slender white line along the costal margin, and within this is a black line not very distinct or clearly defined; the wing-cases also are black towards the margin: in the

hind wings is a series of black spots parallel with the hind margin; these alternate with the wing-rays: in the female the wings are pale smoky brown, with a very indistinct, median, transverse, linear, black spot, and also a series of obscure spots parallel with the hind margin: in the hind wings these spots

44.—Chalk-hill Blue (*Lycæna Corydon*). Male and Female.

have a compound character—orange above, black in the middle, and white below; the fringe is spotted. The under side is gray in the males, gray-brown in the females; all the wings have a transverse median discoidal spot; in the fore wings this is black with a white circumscription; in the hind wings it is white with a very slender black median line: on the fore wings are nine other black spots, and on the hind wings eleven, all of which have a white circumscription: there is also a series of compound spots parallel with the hind margin; these are black, orange, and white; and a sub-median white blotch between the middle of the wing and the hind-marginal series of compound spots.

Obs.—I regret the necessity of acknowledging my inability to differentiate perspicuously the females of *Adonis* and *Corydon*.

Life History.—The caterpillar rests in a flat position on its food-plant, with the ventral surface appressed to the leaves, and its head, legs, and claspers concealed; if annoyed it will fall to the ground, with both extremities slightly incurved; but the anterior extremity most so; the head is almost globular, but rather produced towards the mouth; it is about one-third as wide as the second segment, and entirely retractile within that segment; the body is woodlouse-shaped, and in crawling, as in resting, both the head and legs are concealed; the divisions of the segments are decidedly marked: on the back is a double dorsal row of eight approximate humps, two on each segment from the third to the tenth, both inclusive; the margin of the body is dilated all round, and this greatly contributes to the woodlouse appearance of the caterpillar; the surface of the body is finely shagreened, and sprinkled over with black dots, each of which emits a short but rigid bristle; the surface of the caterpillar in this respect closely resembles the glandular surface of the stems and leaves of some plants: these gland-like bristles are particularly observable on the dilated lateral margin: the legs and claspers form a double medio-ventral series. The colour of the head is dark brown, almost black, and highly glabrous; the body is dull opaque green, with six longitudinal series of oblong gamboge-yellow spots; two of these series are dorsal and approximate, and each series consists of eight such spots; the direction of the spots is rather oblique, and the anterior extremity of each is rather narrowed; these dorsal spots occupy the summits of the humps already described; another series of very similar yellow spots is marginal, occupying the lateral dilatation of each segment, and above this marginal series of yellow spots are the circular and rather conspicuous spiracles; in the two remaining series the yellow markings are linear and ventral, and equidistant between the claspers and dilated margin. It feeds on various papilionaceous plants, as bird's-foot trefoil (*Lotus corniculatus*), kidney vetch (*Anthyllis vulneraria*), and trefoil (*Trifolium*). On or about the 13th of June these caterpillars changed to chrysalids, at the bottom of the glass wherein they were confined, without attaching themselves in the

slightest manner to the food-plant or any other substance: the CHRYSALIS is rounded and without projecting points or angles; the extremities are obtuse: it is covered with short hairs, which, however, are not apparent without the use of a lens; its colour is a pale, dingy, greenish brown, and the cases which envelope the thoracic segments and wings have a semi-transparent appearance.—*Newman.*

TIME OF APPEARANCE.—End of May, the whole of June, and the beginning of July.

LOCALITIES.—It appears to be abundant everywhere in England on chalk, but generally absent where there is no chalk. Mr. Birchall did not meet with it in Ireland or the Isle of Man, and I know of no record of its occurrence in Scotland. In the south of England it is comparatively common. I subjoin a few localities.

Berkshire. Burghfield, near Reading: I mention this, not on account of the rarity of the insect, but because there is no chalk near —*C. S. Bird.*

Buckinghamshire. Drayton-Beauchamp, Buckland, Aston-Clinton—*H. Harpur Crewe;* Halton—*Joseph Greene.*

Cambridgeshire. Cherry Hinton; chalk-pits near Cambridge—*F. Bond.*

Cornwall. Railway banks near Terras, Pill, and other places, tolerably abundant: I am rather surprised at its occurrence here, as there is no chalk near—*Stephen Clogg.*

Cumberland. Grisedale, near Saddleback: Mr. Hope, of Penrith, told me he had taken it repeatedly—*J. B. Hodgkinson.*

Dorsetshire. In plenty on the downs near Dorchester, Lulworth, and Hoddhill; a single specimen at Glanville's Wootton—*J. C. Dale.*

Essex. While collecting with the Rev. W. Bull, in the high woods near Colchester, we were astonished to meet with about a dozen specimens of this insect. I had never seen it there before, nor have I found a single specimen since: there is no chalk anywhere in the district, and no marl within three or four miles of the high woods: a specimen or two have occasionally turned up on the railway banks, but it is a great rarity here—*W. H. Harwood;* in the year 1866, when beating autumnal larvæ in Epping Forest, I observed *Corydon* here and there in all the drives through the forest: I caught some half-dozen, and only notice the circumstance on account of the absence of chalk — *E. Newman;* Herne Bay, *H. D. Greville;* Saffron Walden—*W. R. Jeffrey.*

Glamorganshire. Common at St. Bride's, near Bridgend—*Evan John.*

Gloucestershire. It occurs at Wootton-under-Edge, but is not so common as it was formerly; it used to be very abundant—*V. R. Perkins;* common on some parts of the Cotswolds, at Dursley, and near Cheltenham —*Joseph Merrin;* Rodborough Common—*M. G. Musgrave;* Durdham Downs, and Coombe Glen, near Bristol—*F. D. Wheeler;* near Stroud—*W. H. Grigg;* Clifton—*Alfred E. Hudd.*

Hampshire. Portsdown — *W. Buckler;* taken once on heath in the New Forest—*G. B. Corbin;* hill near Winchester—*J. C. Dale.*

Kent. Every Kent list speaks of its abundance in the county: I have seen it by hundreds in the chalky lane leading from Dartford to Darent—*E. Newman.*

Lancashire. Grange—*Alfred Owen;* abundant at Arnside in Silverdale, more especially about Arnside Tower—*J. B. Hodgkinson.*

Lincolnshire. Common in Lincolnshire on chalk—*T. H. Allis.*

Middlesex. Very rare near Whimbley—*F. Bond.*

Somersetshire. Leigh Woods—*A. E. Hudd.*

Surrey. In all parts of Surrey—*S. T. Klein;* Milford, near Godalming — *C. G. Barrett.*

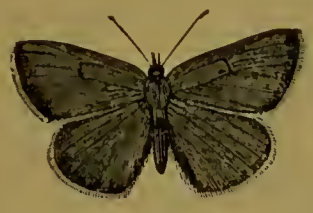
Sussex. Beeching Chalkpit, and near Shanktonbury Ring: plentiful in July—*J. H. White;* plentiful about Lewes—*C. V. C. Levett;* everywhere on the South Downs—*E. Newman.*

Westmoreland. Rough Fields, near Beetham and Milnthorpe, in August—*J. B. Hodgkinson.*

Wight, Isle of. Abundant on the chalk—*James Pristo.*

Wiltshire. Glory Ann, Rainscomb Park, near Great Bedwyn—*J. A. Preston.*

Warwickshire. Once at Knowle—*Frederick Enoch.*



45. Mazarine Blue. (*Lycæna Acis.*) Upper side.

Under side.

45. Mazarine Blue.—The colour of the upper side of the wings is purplish blue, shaded to smoky black at the hind margin; the outer portion of the fringe is white and unspotted. The under side is plain drab, except at the base of the hind wings, and there silvery blue; on the fore wing is a transverse oblong discoidal black spot, exactly half-way between the base and tip of the wing, and again half-way between this and the tip of the wing is a row of five, and sometimes seven, black spots; the hind wings have one black spot near the base, and also near the costal margin; a short black transverse linear discoidal spot in the very middle of the wing, and beyond this a transverse series of black spots, generally eight in number; these spots are nearly circular, and each has a white circumscription.

Obs.—This species has no series of orange or compound spots parallel with the hind margin of the hind wings, and no submedian white blotch.

Life History.—Unknown.

Time of Appearance.—June and July.

Localities.—Unknown in Ireland, Scotland, and the Isle of Man; it is very local in England, occurring here and there in old pastures.

Cambridgeshire. I had the pleasure of capturing here a very good specimen of *Acis* on the 20th of last July, 1858, and one not so good early in August, 1857—*C. Albert Beadan, "Intelligencer,"* vol. iv., p. 141; Cherry Hinton and chalk pits near Cambridge, and Lawston many years ago—*F. Bond;* formerly common in the county, but has not been taken for the last ten years—*Thomas Brown.*

Dorsetshire. Glanville's Wootton, formerly in plenty, but none have been taken since 1841, Powerstock, Parley Copse, Hazlebury—*J. C. Dale.*

Glamorganshire. In 1835, 1836, and 1837 I could take *Acis* in plenty, but have not seen it since—*T. Parry, Merthyr "Intelligencer,"* vol. vi., p. 28; Croesgid, near Llantrissant, rare—*Evan John;* I have seen, but not taken, Glamorganshire specimens—*J. T. D. Llewelyn.*

Gloucestershire. Has been met with at Stinchcombe and Break Heart Hills, near Wootton-under-Edge; specimens from these localities are in Mr. Cooper's collection—*V. R. Perkins;* two specimens at Lower Guiting, on the Cotswold, the beginning of July, 1849—*Joseph Greene;* Dursley—*Evan John, Alfred E. Hudd.*

Hampshire. Near Ringwood, and near Brockenhurst—*J. C. Dale.*

Herefordshire. I took five specimens in one of my father's meadows, called the "Horse Leasow," at Olden Barn, four miles from Leominster, on the 20th June, 1832; four of them were females and one only a male. I have repeatedly seen it since, and my nephew has taken two specimens, but many years ago—*E. Newman.*

Lincolnshire. One specimen was taken at Epworth, in the Isle of Axholm—*T. H. Allis.*

Monmouthshire. I have taken one specimen at St. Julians—*George Lock.*

Somersetshire. I took two or three of these butterflies flying in a pasture-field at the bottom of a hill near Bath; they were much wasted in colour, and appeared to have been long on the wing—*Lewin.*

Warwickshire. *Acis* was formerly taken in plenty near Shirley, but it has not been seen for the last ten years; picture-makers and dealers have exterminated the species—*Frederick Enock.*

46.—Small Blue *(Lycæna Alsus)*. Upper side.

Under side.

46. Small Blue.—The colour of the upper side is smoky brown, faintly tinged with silvery blue, an appearance communicated by the presence of scattered metallic scales; the costal margin is white; the fringe has the basal portion brown, the outer portion white. The under side is silvery gray; half-way between the base and tip of the fore wing is a short, linear, transverse, discoidal spot, and again half-way between this and the hind margin is a transverse series of seven black spots; on the hind wings there is the usual median transverse, linear, discoidal spot, and ten other black spots, one of them near the costal margin at its base, another between this and the inner margin, and another near the anal angle; the remaining eight form an irregular transverse median series; all the spots have a distinct pale circumscription.

Obs.—There is no marginal series of orange spots, and the white submedian blotch is also absent.

Life History.—At page 205 of No. 33 of the "Entomologists' Monthly Magazine," Mr. J. Gedge, of Cambridge, gives us the following interesting account of the oviposition of this species:—

"On June 27th, the perfect insect was out in great abundance, so I set to work to discover its food plant. I soon observed that they did not care much for the great masses of kidney vetch (*Anthyllis vulneraria*), but rather chose to settle upon the scattered flowers of this and other plants. Presently, however, I saw one settle on a flower-head of the kidney vetch which showed no yellow blossoms. I remained perfectly still. It walked down between the flower buds, and dragged its body between the woolly calyces; all round the flower-head it went, and then turned up its body and flew off to another head. Here there were two or three blossoms just open, but it seemed to go through the same process. Upon gathering the flower-heads, I found, in each case, a single egg laid between the downy calyces. This I saw repeated many times. The insect showed great discrimination in the flower-heads she chose; often she settled on one, walked round it, then flew off to another, and sometimes to a third, before she was satisfied. Never did she seem to be content unless there were some buds on the head; at any rate, I particularly noticed that she avoided those where the blossoms had faded, leaving the calyx, the first food of the caterpillar, dry. Twice I saw what I took to be a female settle on the flower-head of the horse-shoe vetch (*Hippocrepis comosa*); in one case the insect remained some time, but in neither case was there any egg. The eggs were of a glaucous hue, and under the microscope were found to be most perfectly reticulated; the meshes which stood out in relief were not hexagonal, as in *Pyrarya Egeria*, but perfectly rhombical, and knotted at the junction of their angles. They hatched on the sixth day (July 3rd). The caterpillars began by eating the hairy calyx, then they passed into it, and fed on the legume."

The caterpillar is woodlouse-shaped, with a small, shining, retractile head, distinctly divided segments, dilated sides, and a shallow medio-dorsal furrow. The head is black, the body green, the medio-dorsal furrow orange-red, with a paler ridge on each side; on each segment is an oblique yellowish line, bordered below by orange-red, and the lateral dilatation is also yellowish, forming a pale side-stripe; on each segment between this side-stripe and the oblique line already noticed is a linear yellowish spot. The chrysalis is obese and blunt-headed; it is attached by a belt to a stalk of the food plant; its colour is yellow, with three longitudinal series of black spots, one of which is medio-dorsal.

Obs.—I have seen neither the caterpillar nor chrysalis of this little butterfly, but the concurrent testimony of Hubner, Duponchel, and others, induce me to place confidence in the foregoing description.

Time of Appearance.—The butterfly is on the wing in June.

Localities.—Mr. Birchall reports *Alsus* to be very common in Galway, and also to occur near Belfast and on the Portmarnock sand-hills, and Mr. Fetherstonehaugh takes it at Bray, in the county Wicklow. In Scotland it appears to be very local. Mr. Birchall reports it from Arran, Ardrossan, and Oban. Dr. Boswell Syme finds it by the railway at Scafield, and also between Kirkaldy and Kingshorn; Dr. Buchanan White says it has occurred abundantly near Perth at several places, as at Broxy, but of late years it has been very scarce; it seems confined to the lowland part of the country, although it occurs in all parts of Scotland, both east and west, and as far north as Forres; the dates of capture in Scotland are June 10 in 1858, May 31 in 1859, and June 15 in 1867. In England it seems to be widely, but not generally, distributed; it does not appear in my lists for Berkshire, Cornwall, Cheshire, Hertfordshire, Middlesex, Norfolk, Northampton, Nottingham, Shropshire, Surrey, or Warwickshire, but is present in all the other county lists.

47. Azure Blue (*Lycæna Argiolus*). Male.

Female.

47. Azure Blue.—The colour of the wings in the male is purplish blue with a narrow black hind-marginal border. In the female there is a broad hind-marginal black band on the fore wings, and a narrow black hind-marginal border in the hind wings, and just within this is a series of six transversely oblong black spots. The under side of all the wings is silvery blue-gray; in the fore wings there is a transverse discoidal black streak half-way between the base and tip, and half-way between this streak and the tip are five, and sometimes six, transversely oblong black spots: the hind wings have a transverse discoidal black streak in the centre, and nine, ten, or eleven black spots scattered over the disk: the fringe is white, slightly interrupted in the fore wings, with smoky black spots.

Obs.—There is no series of orange spots parallel with the hind margin of the hind wings, and the white submedian blotch is also absent.

Life History.—I regret to feel my inability to give, with confidence, any particulars of the life history of this species. I believe it is pretty well established that there are two broods in the year, and that the eggs which produce the first brood of caterpillars are laid on the blossoms of the holly (*Ilex aquifolium*); and the date of the flowering of that tree fixes the date of oviposition. Messrs. Humphreys and Westwood describe the caterpillar as pubescent, and of a greenish yellow colour, with a bright green line down the back, the head and legs being black: the chrysalis, they add, is smooth, brown and green, with a dark dorsal line. My own opinion (expressed very many years ago) that this species migrates, in its alternate generations, from the holly to the ivy, and, *vice versâ*, from the ivy to the holly, was perhaps little more than one of those crude guesses in which all young entomologists indulge; still there are some facts ascertained respecting this insect which favour the idea. At page 98 of the fourth volume of the "Entomologist," we find that in May of the present year Mr. Hedworth observed the insect both flying about and settling on the hollies at Gibside, near Newcastle. At page 112 of the same volume, Mr. Perkins observed it abundantly on laurustinus; on the same page Mr. Clifford says, "the flowers of the

holly, ivy, and buckthorn are the aliment of the caterpillars. These three plants flower but once a year; and while the holly and buckthorn bloom in May, the ivy flowers late in autumn. Yet two broods occur in places where only one of the food-plants named is found; and it would appear, from the condition of the spring brood, as if they had not hybernated, and that there must have been, therefore, two broods of caterpillars. I have seen a female in August depositing eggs amongst ivy, so probably it hybernates in the chrysalis state." Mr. Horley, of Hoddesdon, informs me that in November of last year he beat a caterpillar of *Argiolus* from the blossoms of the ivy, on which it appeared to have been feeding: it changed to a chrysalis the same month, and to a butterfly during April of the present year: this information, coupled with the preceding from Mr. Clifford, seems to point to ivy bloom as the food of the second generation of caterpillars of *Argiolus*, and also shows that in this instance at least the insect passed the winter in the chrysalis state.

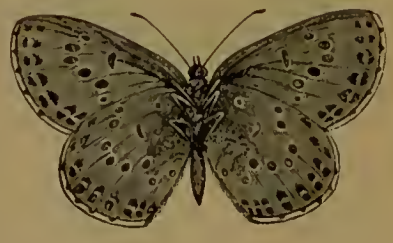
Time of Appearance.—The flowering of the holly (*Ilex aquifolium*) fixes with sufficient accuracy the time when the first brood of caterpillars is feeding, and the flowering of the ivy (*Hedera Helix*) may be taken as a guide to the second brood of caterpillars. With regard to the butterfly being on the wing, the following note, which appeared at page 258 of the first volume of the "Zoologist," show that there is a pretty constant succession of individuals from May to August, both months inclusive. It was contributed by Mr. W. Gaze. "On referring to my register I find that the first specimen of this butterfly I ever possessed was captured at Kedington on the 9th of May, 1833, and was the only one obtained that year: in 1834 one was taken on the 31st of July, and others on the 1st, 8th, and 12th of August: in 1835 the dates of capture were May 8th, 16th, and 19th; June 6th; July 23rd, 27th, and 30th; August 1st and 6th; on the 19th May and 6th of August it was very abundant: in 1836 I took a male at Lavenham on the 7th May, which is the earliest date I ever saw it, and it continued very abundant in the same locality during the whole of that month." At page 334 of the same volume Mr. R. C. R. Jordan extends the period of its appearance by announcing a capture on the 8th of April.

Obs.—At page 213 of the fifth volume of the "Entomologist," Mr. Watkins, of Painswick, gives the following curious instance of depraved taste in this butterfly:—"During July of the present year a drain, which was opened on our premises, attracted several fresh specimens of *L. Argiolus*. It was very interesting to watch them flying over the drain, sometimes alighting to sip the sewage, which they seemed to prefer to the flowers in the adjoining fields." My readers will recollect a similar instance of depraved taste in the Purple Emperor.

Localities.—Generally distributed throughout Ireland, where the holly, on which the caterpillar feeds, is a very common tree. I have no record of its occurrence in Scotland or the Isle of Man. In the south of England it is a common insect, but seems very rapidly to decrease in abundance as we travel northwards.

Warwickshire. Immense quantities were taken in Sutton Park on the 11th of May, 1856—*F. Meyer* in "*Intelligencer*," vol. i., p. 59.

48.—Large Blue (*Lycæna Arion*). Upper side of Male.



Under side of Female.

Under side of Variety in Mr. Bond's Collection.

48. Large Blue.—The hind wings have the hind margin very slightly scalloped. The colour of all the wings is a dull heavy blue, without any of that brilliancy that adorns *Icarus* and *Adonis*; the hind margin of all the wings is black: in the fore wings, and equally distant from the base and tip, is a transversely oblong black discoidal spot, and between this and the hind margin, though still near the middle of the wing, is a transverse series of seven longitudinally oblong black spots: the hind wings have a mere indication of three or four black spots near the middle, and a series of five or six black spots near the hind margin; these have a pale circumscription; the scalloped margin of the hind wings is black, and the fringe of all the wings white. The under side is pearly gray, the base of the hind wings being silvery blue, with a metallic lustre; round the hind margin of all the wings is a double row of obscure black spots; in addition to these, and nearer the middle of the fore wings, are eight intensely black spots, and thirteen similar spots on the hind wings; all these have a white circumscription.

Obs.—This butterfly is distinguished from all other blues inhabiting this country by its larger size, by its scalloped hind wings, by the cluster of black spots in the middle of the fore wings on the upper side, and by the double series of black spots on the hind margin of all the wings, on the under side: these are always unaccompanied by any tinge of orange: the submedian white blotch is also absent.

Life History.—Zeller tells us that the egg is laid on the wild thyme, and that the caterpillar feeds on that plant—a statement copied by myself in the previous editions of this history, and still, as yet, only partially confirmed.

I am indebted to Mr. Merrin for eggs of this species: they were accompanied with the following communication:—"Having at length succeeded in obtaining eggs of *Lycæna Arion*, I am pleased to be able to send you six of them—four on as many sprigs of thyme, and two on another piece. I followed a female specimen last Saturday to a fine patch of thyme, where I watched her for a quarter of an hour, and distinctly saw her lay several eggs. Some of these I afterwards took away, and others I left, marking the plant for future observations. I gathered a large number of likely looking pieces of thyme on the ground, and on examining them afterwards at home with a glass, found about twenty eggs. They seemed to be generally laid singly on the largest heads of flowers, and those which are most pubescent seem to be preferred. Sometimes, however, I found two eggs on a head, and in one case no less than six." Being from home when the box containing these treasures was so kindly despatched from Gloucester by Mr. Merrin, a delay of some days occurred before it reached my hands, and five out of the six eggs had hatched; the sixth was still perfect, and was forthwith submitted to examination: I found this egg to be a spheroid, much depressed at the north pole, and concave at the south pole, where it was very slightly attached to the hairs of the calyx of a flower of the thyme, on which it had been deposited by the female parent. The surface of the egg is reticulated, the network projecting, and thus communicating a cellular or honeycombed appearance to the egg; the cells are shallow, much more so than those of a honeycomb, and the surface rather more resembling that of a cow's stomach; the septa dividing the cells are extremely thin, and at every junction of septa is an elevated process almost spine-like; the array of these is very conspicuous when the egg is viewed in profile: the cells are of nearly equal size, except at the north pole and in its immediate vicinity, where they suddenly decrease in size, and are, in fact, exceedingly small. The

colour and texture of the egg much resemble white porcelain, with the slightest possible tint of green, excepting the circular space at the pole occupied by the smaller cells, where the green tint is very decided and the limits of this darker colour are clearly defined. On the 4th of July a CATERPILLAR escaped from the egg-shell, and a considerable portion of shell was also absent, as though eaten by the late occupant; the remaining portion of the egg-shell was perfectly colourless, and exhibited a still greater resemblance to fine porcelain. The extruded caterpillar was colourless, but the intestinal canal, filled with an orange-coloured substance like the yolk of a duck's egg, was plainly perceptible. Each segment of the body emits a few scattered hairs: these seem particularly observable near the anal extremity. Mr. Porritt, of Huddersfield, advanced one step farther. He informs us, at page 166 of the same journal, that on the 4th of May two young caterpillars emerged from eggs in his possession; one of these, which had a black head and a pinkish body, he placed on a fresh flower-head of thyme, to which it soon attached itself so closely, and was so similar in appearance, that it was with difficulty he could distinguish it. It fed well until the 14th, when he found it stretched out at full length along the mid-rib on the upper side of a thyme leaf; and, being in the same position the next day, he concluded that it was about to undergo its fine moult. A day afterwards this change was effected, and Mr. Porritt then made the following description: Length, about one-sixth of an inch; stout, but tapering towards the head, which is much smaller than the second segment; the general colour was dirty pink, the head brown and shiny; behind the head is a large, almost plate-like, dull black mark, from which extends the rather broad, conspicuous, rust-coloured dorsal line; the body is sparingly clothed with light brown hairs.

TIME OF APPEARANCE.—In 1835, June 8 and 15; in 1798, June 28; in 1836, June 29; in 1833, July 3; in 1799, July 5 and 9; and in 1819, July 14.—*J. C. Dale.*

LOCALITIES.—It has not been reported from Ireland, Scotland, or the Isle of Man. In England it is decidedly local, its ascertained range being restricted to the ten counties mentioned below. Its "metropolis," if I may borrow an expression from the revered fathers of British entomology, is in South Devon; it has occurred in some abundance in Somersetshire, and on the Cotswold Hills in Gloucestershire; from Gloucestershire we ascend to a Midland county, Northamptonshire, in which county a considerable number have been taken: the remaining seven counties have produced but few specimens. All our recent information respecting this species is contained in the "Entomologist," from which journal I have made the following extracts:—

Bedfordshire. Taken in Bedfordshire and sent to me by my friend, Dr. Abbott—*A. H. Haworth*, in "*Lepidoptera Britannica*," page 45.

Buckinghamshire. Clifden—*Lewin.*

Devonshire. It occurs only on the mica slate formation from Bolt Head to Bolt Tail during the latter part of June and beginning of July—*J. J. Reading.* I was very successful this year [1865] in capturing on the 17th of June thirty-six specimens of *Lycæna Arion* near Plymouth, some of them much wasted; the weather was very boisterous, but I fortunately got into a sheltered nook under some high cliffs, where apparently there had been a land-slip some years before: the ground was very rough, and it was with great difficulty that I could travel over it, or I should have taken more—*G. C. Bignell*, "*Entomologist*," vol. ii., p. 295. From the Bolt Head to the Bolt Tail. One year I took it wasted on the 14th of June, but the following year it did not make its appearance until the 7th of July. Another year I found it very sparingly on the 14th of July, and then only just coming out. It is an insect, in my opinion, which, if not taken within two days of its emerging from the chrysalis, is worth nothing for a cabinet specimen, for the white fringe will then be gone, as well as most of the blue scales on the upper side of the wings. Anyone desiring to take this insect

in our neighbourhood must regulate his visit according to the weather during the past spring; he cannot do better than stop at the "King's Arms," Salcombe, for the night. Bolt Head is an out-of-the-way place to get at. The nearest point by rail is Kingsbridge Road; you can take the coach from thence to Kingsbridge, a distance of about ten miles. From thence to Salcombe is about four miles by steamer or boat, and then you have about two miles' walk to Bolt Head; the slopes here are very steep, and in dry seasons it is absolutely necessary you should have spikes or long hobnails in your boots, to make sure of your footing, for it puts one in mind of walking on ice, it is so excessively slippery—*G. C. Bignell.* [This is written five years subsequently to the preceding note.]—When I last had the pleasure of seeing you I think you told me that you were not aware that the Bolt Head on the coast of Devon was a locality for *Lycæna Arion:* two years since, when with some friends, we caught several dozen of that species, and about a fortnight since many were again taken in that locality by a friend of mine—*John Gatcombe,* "*Entomologist,*" vol. iv., p. 301. It is very abundant on a rough piece of ground near a village about ten miles from Kingsbridge, in South Devon; I have the name of the village and unquestionable evidence of the correctness of this statement, but have received exact particulars of the locality from Mr. J. F. Hanbury on the condition of not publishing it—*E. Newman.*

Dorsetshire. One specimen was taken by D. Morris at Charmouth, but I have heard of none since—*J. C. Dale.*

Gloucestershire. Rodborough Common, Sapperton, Miserdine Park, Daneway Common—*M. G. Musgrave. Lycæna Arion* has turned up again here [near Gloucester]. I captured three pairs on the 20th, 21st, and 22nd of June, 1867, in beautiful condition, and a few days later a fourth pair, rather worn. On the 29th I was out with a friend, when we took seven specimens, but in very bad condition, and we let some fly again in consequence—*Herbert Marsden,* "*Entomologist,*" vol. iii. p. 314. Several years ago I found *Arion* sparsely distributed on the Cotswold Hills, and it was found by others on other portions of the same range, but from some of the localities in which it was once found it has since disappeared. Last year [1865] several specimens were taken by my friend, Mr. Marsden of Gloucester, in the same neighbourhood in which I had taken it; and this year I was fortunate enough to capture eleven specimens, and Mr. Marsden has taken still more. Owing to the forwardness of the season generally for insects, it became a nice point for calculation when to look for this species with the prospect of finding it. It is generally from the 14th to the 20th of June, but this year I took the first eleven specimens on the 6th of June. Most of them were in good order, although one or two had evidently been out some days. There was a strong wind blowing, as there generally is on the exposed places occupied by *Arion*, and doubtless this tends quickly to damage its delicate plumage; the spot most frequented by them was, however, partly sheltered by a stone wall. The same locality subsequently yielded as many as were taken on the first day, while all the district round about, though much of it is of the same character, was perfectly clear of them. This tends to show that the species is very local. On another spot, some miles distant, but of a similar broken character, the species was also found, the area, however, being still more contracted. The ground in both cases consists of deserted quarries, from which broken stone has been taken, the sides of the quarries being left sloping, and thick grass, with the usual herbage of hills, growing near. This herbage includes wild thyme, sun-cistus, wild geranium, wild forget-me-not, milkwort, yellow trefoil, and several species of coarse grass—*Joseph Merrin,* "*Entomologist,*" vol. iv., p. 105. On June 1st [1868] I took one specimen of *Arion* on the north-east side of Painswick Hill; business prevented my visiting the place again in the daytime, but, having spent four evenings searching in the same place, I succeeded in taking twelve specimens. The last I took on the 23rd of June; it was much worn in appearance. I found them at rest on the

long stems of a species of coarse grass in exposed situations. The ground is rough and broken, consisting of small quarries not in use. There is a wood a short distance off. The extent of ground over which they were found is about half an acre—*C. J. Watkins*, "*Entomologist*," vol. iv., p. 120.

Hampshire. Formerly taken on hills near Winchester, by Mr. Griesbach, when a boy at school there; some of the specimens were in Mr. Curtis's collection—*J. C. Dale.*

Herefordshire. Taken near the aqueduct at Hereford, but rare—*F. E. Harman.*

Huntingdonshire. Monk's Wood, in July—*J. F. Stephens.*

Northamptonshire. The great prize of all the butterflies of the neighbourhood of Polebrook, I hold to be *Lycæna Arion*, which, if I mistake not, was discovered here by myself thirteen or fourteen years since. It is confined entirely, as far as my experience goes, to Barnwell Wold and the adjoining rough fields, with the exception of a single specimen which I once met with in a rough field near Polebrook. Its flight is somewhat peculiar, being different from that of others of the same genus, and more resembling that of *Cœnonympha Pamphilus* and *Epinephele Tithonus*. Independently of its manner of flight and size, it is in most instances easily distinguished on the wing from the other blues by its dark and irony appearance. Many entomologists have, of late years, visited Barnwell Wold in search of *Arion*; in short, a summer never passes without meeting in my rambles brother entomologists from different parts of the country; I rejoice, however, to be able to state that its annual occurrence does not appear to be diminished in consequence. Unless my memory fails me, I think Mr. Wolley, of Trinity College, Cambridge, informed me that one year he captured, in a few days, between fifty and sixty specimens in and about Barnwell Wold, though, in point of weather, the days were anything but favourable—*William Bree*, "*Zoologist*" for 1852, page 3350. I have again this season taken this beautiful insect in plenty at Barnwell Wold, forty-nine specimens: it is a very local insect, for although I have searched the Wold well, I have only found it in one spot, in the corner of a rough pasture under a wood; it is an easy insect to take, flying very low, and is very conspicuous, settling occasionally on wild thyme (*Thymus serpyllum*), the purple bugle (*Ajuga reptans*), and a dwarf thistle; but I have never seen it on bramble blossoms, although they are very abundant—*Frederick Bond*; I captured a single specimen of *Arion* near the village of Wigsthorpe, Northamptonshire, between the 3rd and 20th of June, 1841: it is rather a singular variety, and not larger than *Lycæna Ægon*—*Henry Doubleday*, "*Entomologist*," vol. i., p. 156.

Somersetshire. I took about forty specimens on the 15th June, 1833, in a situation abounding with long grass and brambles, at Langport, near Taunton; and on the same day in 1834 I took about twenty specimens, and Mr. Dale ten—*John Quekett*; subsequently Mr. Quekett visited the same locality on several occasions, and always with the same success—*E. Newman*; hills near Bath—*Lewin.*

Wiltshire. Marlborough Downs—*Lewin*; Savernake Forest—*T. A. Preston.*

Natural Order IV.—Worm-shaped or Cylindrical Caterpillars (in science, *Vermiformes* or *Cylindracei*).

The distinguishing character is that the caterpillars are worm-shaped or cylindrical: in this country they are commonly spoken of as *grubs*, and in France as *vers*: generally speaking, they are excessively destructive to cultivated vegetables, and are a constant source of loss and annoyance to the farmer and gardener: they are without spines or conspicuous bristles, and the skin has often a velvety or downy appearance, which is attributable in a great measure to the presence of very numerous minute warts, each of which emits a hair. The British species constitute three very natural families.

Family 9.—Redhorns (in science, *Rhodoceridæ*).

The caterpillars are smooth, cylindrical, and velvety: they generally feed on leguminous plants, more particularly trefoils and

clovers; but one species, which is by far the most abundant, feeds on the common buckthorn (*Rhamnus cathartieus*), a plant of a very different Natural Order: they turn to chrysalids in spring or summer, and to butterflies early in the autumn, and pass the winter in that state. The chrysalis is belted and attached also by the tail; its head is pointed and undivided, and seems to be held as far as possible away from the food-plant to which it is attached. The butterfly has six legs, perfectly formed, for walking, and in all the species with which I am acquainted the antennæ are short, and tinged with red: there is also a marked prevalence of yellow or orange colour in the wings; in the Arctic species, of which we know very little, a tinge of dull blue is often observable. The Continental species, *Colias Nastes*, *Colias Phicomone*, and others partake decidedly of this character; and some species of the same genus, brought home by our Arctic voyagers, still more nearly resemble the larger Blues, such as *Lycæna Arion*.

49.—Pale Clouded Yellow (*Colias Hyale*).

49. Pale Clouded Yellow.—The antennæ are short, straight, and decidedly clubbed; they are of a reddish-brown colour, the club being rather darker, and the extreme tip paler; the fore wings are slightly arched near the base of the costal margin, very straight in the middle, and blunt at the tip: the colour is sulphur yellow, the fore wings having a black band, which occupies the whole of the apical area; this band is very broad at the costa, and decreases gradually to the anal angle: it is interrupted by a median series of conspicuous, but not clearly defined, sulphur-coloured spots; a little above the middle of the wing is an intensely black oval spot: the hind wings have a slender and ill-defined black margin, and a large median saffron-coloured spot, which is almost double.

Varieties.—There are two distinct shades of colour among the individuals of this butterfly; the more common colour is canary-yellow or sulphur, the other white, with the faintest possible tinge of yellow. Lewin, in his "Insects of Great Britain," page 70, treats of them as species, calling the yellow ones the "Clouded Yellow," and the white ones the "Pale Clouded Yellow:" he gives excellent figures of the upper and under side of each: Haworth rejects the white ones as a species, but retains them as a variety (var. β): Dr. Leach, a most careful observer, and one whose opinion all entomologists receive with profound respect, says "there is a pale variety of each sex;" and the same remark is repeated in Samouelle's "Useful Compendium." Notwithstanding this accumulation of evidence, I incline to dissent from the opinion expressed; the white or whitish individuals appear to me to be exclusively female, while the yellow ones are both male and female, but most commonly male. At page 355 of the first volume of the "Entomologist," Mr. Dale makes an observation exactly in accordance with my own view; he says, "*Colias Hyale* has occasionally a white female." Notwithstanding such a repeated expression of opinion in favour of considering the difference of colour as specific or varietal, entomologists in this country have gradually arrived at the conclusion that the difference in colour was only sexual—a conclusion that, I think, cannot be maintained.

Life History.—In the spring of the year the eggs are laid on various species of clover and trefoil by females that have hybernated in the perfect state; they hatch in a very few days, probably from five to fifteen: the young caterpillar is of a pale green colour, the head being remarkably small in comparison with the body: when in a state of repose it lies along the middle of the leaf on the upper side, so that at night, when the clover shuts up its leaves in sleep, the little caterpillar is quite enclosed and protected alike from wet and

cold, a beautiful exemplification of the beneficence of an all-wise Creator in providing for the safety, preservation, and welfare of all his creatures, however apparently insignificant: the edges of the leaf meet with such nicety and exactness over the delicate little creature that they seem adherent to each other as though glued together. This interesting observation was made by Mr. W. H. Tugwell, and published in the "Entomologists' Weekly Intelligencer" for 1857. Hubner and others have figured the full-grown caterpillar: it is represented as having a moderate sized head and cylindrical body, the segments of which are clearly marked and rather tumid; the colour of both the head and body is dull olive-green sprinkled with black dots; in the region of the spiracles it has a narrow white side-stripe interrupted with yellow; it feeds on several leguminous plants besides those which are cultivated, and when full-fed attaches itself to one of the stems, and turns to a green chrysalis with an ochreous border to the wing-cases, and an ochreous stripe down the side extending to both ends: it is attached by a belt as well as by the caudal hooks.

Time of Appearance.—The butterfly has sometimes been seen on the wing in the spring months, also occasionally during the last few days in July, and often throughout August, at the end of which month it retires for the winter. Concerning the caterpillar little can be said, few entomologists having seen it in this country, and no one has made observations as to the date of its appearance.

Localities.—This butterfly is particularly fond of clover and lucerne when in blossom; it has also a decided partiality for chalky districts, especially near the sea, hence the maritime counties of Kent and Sussex have been the most productive of specimens. It has never been observed in Ireland, Scotland, or the Isle of Man. The recorded localities in England are as follows:—

Cambridgeshire. Not uncommon in the county—*Thomas Brown.*

Cumberland. Newbeggin Wood; my father missed one in the large field going into the Wood—*J. B. Hodgkinson.*

Derbyshire. One specimen taken at the Via Gallia, near Cromford, by the late John Wolley. I have seen the specimen—*H. H. Crewe.*

Devonshire. Whitsand Cliffs, Totnes, Plymouth racecourse—*George C. Bignell;* Torquay, Sidmouth, Babington—*J. J. Reading.*

Dorsetshire. Seen by Mrs. Dale—*J. C. Dale.*

Essex. Colchester, but rare—*W. H. Harwood;* Epping—*W. J. Argent;* common at Herne Bay in 1868—*H. D. Greville;* Saffron Walden—*W. R. Jeffrey.*

Gloucestershire. Has occurred near Gloucester—*Joseph Merrin.*

Hampshire. Railway banks and roadside banks near Farlington—*W. Buckler;* near Brockenhurst occasionally—*F. Bond;* Bramshott and Liphook—*C. G. Barrett;* Portsdown—*Henry Monereaff.*

Herefordshire. One taken by Mr. Walter Hutchinson at Kimbolton, near Leominster, in 1868—*Mrs. Hutchinson.*

Kent. Plentiful in clover fields about Dover Castle, and lucerne fields at Folkestone; in 1868, one at Tonbridge—*G. H. Raynor;* Selling, Chilham, Shotterden, Horslip, Stockbury—*H. A. Stowell;* Tenterden—*John Scratton, Jun.;* Darent and Birch woods—*W. Machin;* New Cross—*E. Newman.* Several at Forest Hill in 1857, occasionally at Margate in following years; at the end of July and beginning of August, 1868, this was the commonest butterfly to be seen at Marsh Bay, Margate, where the specimens were flying by hundreds. It was a lovely sight to see these handsome creatures settled on the flowers, and swaying to and fro in the wind: the rich gold colour of their under side contrasting beautifully with the purple flowers of the lucerne; *Hyale* was abundant all over the Isle of Thanet; wherever a little patch of lucerne was to be seen, *Hyale* was sure to be there, even close to the houses: its head-quarters, however, were decidedly at Marsh Bay, which lies between Birchington and Margate, about a mile and a half to the west of Margate; we captured about eight hundred specimens: it would have been easy to have

taken thousands—*H. Ramsay Cox*, "*Entomologist*," vol. iv., p. 179; it appears periodically in all the open country between Canterbury and the sea—*W. Oxenden Hammond.*

Norfolk. Norwich—*C. G. Barrett;* Aldeby in 1868—*N. Fenwick Hele.*

Suffolk. Beccles, Ringsfield—*W. M. Crowfoot.*

Surrey. In 1835 it was common at New Cross by the "Five Bells," and on the spot where some of the buildings of the railway station now stand; more than a hundred specimens were taken in that immediate neighbourhood by myself and others — *E. Newman;* Haslemere in 1868—*C. G. Barrett.*

Sussex. Prinstead, railway bank—*William Buckler;* near Chichester—*W. H. Draper;* one at Bognor—*Roland Trimen.*

Warwickshire. A single specimen was taken near Edgbaston Reservoir in 1868—*Frederick Enock.*

Wight, Isle of. Ventnor and Newport—*Alfred Owen;* rare—*J. Pristo.*

Obs.—The fitful and most capricious appearance of this lovely butterfly in England has led to many predictions and hypotheses respecting the periodicity of its visits; but all attempts to systematize these visits have proved futile. At page 236 of his "Entomologists' Useful Compendium," Mr. Samouelle says, "It occurs in England once in three years, some seasons only locally, at others in the greatest profusion in every part of the country. Mr. Desvignes subsequently suggests, at page 388 of the first volume of the "Entomologist," that it has a periodicity of seven years. It certainly appeared in profusion on the south-eastern corner of our island in 1821 and 1828, but in neither year do precise records appear to have been kept; and I obtained this information subsequently to its multitudinous appearance in 1835, and in consequence of Mr. T. Desvignes' prediction that it would abound in a similar manner in 1842. This excellent naturalist wrote to the following effect: "You very well know that, ever since I took *Hyale* near Brighton in 1835, I have foretold that it would appear in 1842. I made this conclusion from seeing a few specimens with a Brighton collector when I was down there, and asking him how he came to know they would be out that year; he told me he took them seven years previously (namely, in 1828), and from this I concluded they would be found again in seven years from that time (namely, in 1842)." This prediction, and the facts on which it was based, induced me to look backwards "through the dim vista of departed years," and I found some support to this septennial hypothesis in the facts ascertained. When, therefore, the insect visited us in such abundance in 1842, it really seemed as though we had acquired the knowledge of a law of Nature previously hidden from us. Alas! however, for our speculation, the theory broke down utterly in 1849, for only about twenty specimens were that year recorded in the "Zoologist," a journal which had then taken the place of the "Entomologist," which was discontinued for a time. In 1856 there are a few records, both in the "Zoologist" and the "Entomologists' Weekly Intelligencer," which had then commenced its useful career. In 1863 scarcely any notes of the appearance of *Hyale* were preserved, and in 1870 it has scarcely condescended to make itself known as a British insect; but, unfortunately for human calculation, it absolutely swarmed, as we have seen, in 1868, when its advent was not predicted.

50. Clouded Yellow (*Colias Edusa*). Male.

50. Clouded Yellow.—The antennæ are short, straight, and decidedly club-shaped; their colour is red, the club being rather darker, and the tip paler. The fore wings are rather arched near the base, very straight in the middle of the costal margin, and blunt at the tip. Their colour is brilliant saffron-yellow, with a broad black hind-marginal

band, which not only extends to the apical angle, but is continued in a very narrow form along the inner margin as far as the middle; in this band is a series of five or six yellow

Variety of the Male in Mr. Bond's Collection.

Female.

Variety *Helice*.

spots; these are very conspicuous, but not very distinctly outlined; near the middle of the wing, but rather above the middle, is an oblong black spot: the hind wings have a black hind-marginal band extending to the middle of the costal margin, and interrupted by a series of four or five yellow spots. In the male these bands have a very well-defined interim border, and the wing-rays towards the tip are yellow, but the yellow spots in the black band are wanting: the hind wings in both sexes have a large and intensely orange spot in the centre, but this is rendered less conspicuous by the surrounding area being so nearly of the same rich colour.

Varieties.—Mr. Bond possesses an extraordinary variety of the male, which he has kindly lent me to figure in this work, and in which the saffron-coloured part of the wings is clouded and blotched with smoky brown. There is also a beautiful variety of the female of this insect in which the usual rich saffron-yellow colour is entirely absent, and is replaced by pale ochreous, approaching to white: the hind wings are darker than in ordinary specimens, and the central orange spot, owing to the contrast of colour, is more conspicuous. This is the *Papilio Helice*, or White Clouded Yellow of Haworth (*Lepidoptera Britannica*, p. 12, No. 11).

Obs.—Although this variety in its extremest form is so different from the type, there occasionally occur intermediate specimens.

Life History.—The eggs are laid in May and June by females that have hybernated, on the leaves of Dutch clover (*Trifolium repens*), common clover (*Trifolium pratense*), and very probably on other species of the same genus of plants: they are placed in an erect position on the upper side of the leaf, and are shaped much like a ninepin, somewhat tapering towards both ends, and decidedly pointed at the tip; their colour, when extruded, is pale yellow, but they gradually assume a darker hue, and finally become tinged with pink; some of these eggs I obtained through the kindness of Mr. Alfred Owen, and it is very noteworthy that three of them were attached to the long hair-like scales which clothe the body of the parent; the young caterpillars emerged on Midsummer-day, but they died almost immediately, and I made no description of them in their babyhood. Shortly after this untoward occurrence, Mr. Buckler most kindly sent me a caterpillar about three-quarters grown, and I made the following description. It rests in a nearly straight position, but with the anterior segments slightly raised, and the head slightly

bent under, Sphinx-like; when annoyed, it falls from the food-plant and forms a complete ring: the head and body are of nearly uniform width, the body cylindrical, the thoracic segments somewhat incrassated, the terminal segments somewhat attenuated; the crown is gibbous and without a notch; the head is covered with minute warts, and each wart emits a short hair; the segmental divisions are indistinct and transversely wrinkled, the wrinkles dividing each segment into narrow sections, each section composed of a series of minute warts, and every wart emitting a short hair: in form and habit this caterpillar much resembles that of the Small White Cabbage Butterfly. The colour of the head and body is grass-green, the minute warts being black, and each being surrounded by a whitish ring: there is a very distinct but rather narrow whitish stripe along each side; it commences on the second and terminates on the twelfth segment, including the spiracles, which are yellowish.—*Newman.*

The individual described never became a chrysalis; but Mr. Buckler was fortunate in obtaining a number of chrysalids from the same brood of eggs, and of these he published the following description in the forty-first number of the "Entomologists' Monthly Magazine:"—"The CHRYSALIS was attached by the tail, and with a belt of silk thread round it close below the thorax: the head was generally upwards, though in some cases a horizontal position, or nearly so, was chosen: the chrysalis is moderately stout; the thorax round, and projecting on the back; the head terminating in a sharp point; the wing-cases are long and well developed, projecting below the body. The colour of the back and body is a very pale yellow-green, and a pale yellowish stripe on each side below the wing-cases, on the body; on the under side beneath them were three minute black dots, followed by a stripe of dull dark red; the wing-cases were a rather deeper and yellower green, which, a few hours before the perfect insect emerged, became suffused with red. In the centre of each wing was a minute black dot, and a row of five similar dots near their lower borders. The point on the top of the head was dark olive-green above, sharply contrasted on the under side with pale primrose yellow, and both gradually blending into the colours below."—*Buckler.*

Mr. Buckler has also noticed a character of the caterpillar which altogether escaped me. He says the whitish side-stripe "was embellished on each segment by a pink or red blotch in the middle of it, and a black spot immediately under it; while a little in advance of the red was seen the oval whitish shining spiracle."

TIME OF APPEARANCE.—August, September, October, and November: it hybernates, but very frequently perishes before the spring; the survivors reappear in May and June.

Obs.—At p. 77 of No. 51 of the "Entomologists' Monthly Magazine" there is an interesting note by Mr. C. W. Dale, in which he says:—"I found a caterpillar of *Edusa* last October at Charmouth; it changed to a chrysalis on our journey home, and died in the act of emerging at the end of March." This is the only well-authenticated instance I have met with of this species passing the winter in the chrysalis state: it must be a very rare occurrence.

LOCALITIES.—Clover and lucerne fields when in blossom. We learn from Mr. Birchall that in Ireland it is common in some seasons on the south and east coast: it occurs more rarely north of Dublin: appeared in profusion at Killarney in 1835. The Hon. Emily Lawless informs me it is occasionally abundant at Lyons, in the county Kildare, both in the garden and hill wood: it is also occasionally taken in one or two localities near Dalkey, county Dublin. Mr. Fetherstonhaugh has taken it at Glenmore, Crossmolina, and has found it, but not abundantly, in the county Wicklow; and Mrs. Battersby records the capture of one specimen near the village of Stone. It has been taken by Mr. Warrington near Douglas, in the Isle of Man. Mr. Birchall informs me of a single specimen—a female—which he took at Largs on the 12th of September, 1852, but it is entirely omitted by Dr. Buchanan White in his "Butterflies of

Perthshire," although he reports it as having occurred both in Dumfriesshire and Ayrshire. In England it is very generally distributed, but its appearance is capricious. We have seen how its congener *Hyale* has occasionally swarmed in the extreme south-east of the island. *Edusa* is occasionally equally abundant in the extreme south-west; in the intervening southern counties neither of the species can be described as common; and farther north both are comparatively scarce. In every list from Bedfordshire, Berkshire, Buckinghamshire, Cheshire, Derbyshire, Dorsetshire, Glamorganshire, Hampshire, Hertfordshire, Huntingdonshire, Kent, Middlesex, Monmouthshire, Norfolk, Northamptonshire, Nottinghamshire, Shropshire, Somersetshire, Staffordshire, Suffolk, Surrey, Sussex, Warwickshire, Wiltshire, and Worcestershire, it is reported as occurring, but without any particular notes of its abundance, rarity, or periodicity.

Cambridgeshire. In many parts of the county it is sometimes very common — *F. Bond;* not uncommon in the county—*Thomas Brown.*

Cornwall. Common at New Quay—*H. D. Greville;* sometimes very abundant at Looe: at page 338 of the second volume of the "Entomologist," Mr. Clogg informs us that in the autumn of 1865 it was abundant: during the months of August, September, and up to the 14th of October, a single collector, on counting his captures, found he had taken three hundred and forty-six specimens: he then, at Mr. Clogg's request, kept a daily record, with the following result:—October 14th, seventy-eight; 16th, eighty-two; 18th, twenty-five; 20th, seventy; 25th, thirty-eight; 28th, seventy-five; November 1st, seventy-seven; total, nine hundred and thirty-five. The numerical disparity in the sexes was at first most remarkable, there being taken, up to the 14th of October, but twenty-three females to three hundred and twenty-three males: after that day the females became more plentiful, or at the rate of fourteen males to one female, until, on the last day, they exceeded the males, the numbers being twenty-three females and twenty males: the total number of females captured was one hundred and ninety, reducing the average to four males to one female. There were eight of the pale (or *Helice*) variety taken. With very few exceptions, all these captures were made in two fields of wheat stubble, together about twenty-six acres in extent, situated close to the sea shore, very hilly, and with a south-east aspect." At page 1 of the third volume of the "Entomologist," Mr. Clogg makes some slight corrections to his former report, and brings up the grand total to nine hundred and seventy-two.

Cumberland. This insect is more common in Cumberland than was formerly the case, specimens occurring all up and down, but most commonly on the coast about Workington, Carlisle, and Whitehaven—*J. B. Hodgkinson.*

Devonshire. The typical form is very abundant along the coasts of Devonshire, and common in many localities inland; but it is very inconstant in the period of its appearance: sometimes, indeed, several consecutive years have passed in which the insect has not been observed. The variety *Helice* usually occurs freely: Axminster, Exeter, Teignmouth, Torquay, Buckfastleigh, Whitsand Cliffs, Bovisand, Plymbridge, Berry Head, Bolt Head—*J. J. Reading;* Compton, Milbrook—*G. C. Bignell;* on the railway banks at Tothill, near Plymouth—*E. James, Jun.* Through the kindness of correspondents these and many other localities have reached me from several sources in addition to those mentioned: in no other instance does the writer allude to the inconstancy of appearance mentioned by Mr. Reading, so that the inference to be drawn is that the insect is generally of frequent occurrence in the county.

Durham. Scarce, and appearing at uncertain intervals, in the autumn; Fulwell in 1826, Castle Eden Dene, Darlington, Sunderland, Shull, Wolsingham, Ryhope — *Wailes' "Catalogue."*

Essex. In all parts of the county, and apparently occurring every year, although some years more plentiful than others—*W. H. Harwood.*

Gloucestershire. Wootton-under-Edge; generally to be found every year in the clover fields; once or twice it has occurred in the greatest profusion, probably introduced with the turnip seed—*V. R. Perkins;* generally distributed, and sometimes common—*Joseph Merrin.* Mr. Greene, Mr. Wheeler, Mr. Grigg, Mr. Musgrave, and Mr. Hudd write to the same purport.

Herefordshire. Common in 1858 and 1859—*Mrs. Hutchinson.*

Northumberland. One specimen was taken at Whitley—*J. Hancock.*

Wight, Isle of. It occurs every year in the island in clover fields, but not always in equal abundance: generally common, sometimes abundant—*James Pristo.*

51. Brimstone (*Rhodocera Rhamni*). The lower figure represents the body of the butterfly viewed sideways, showing the curved antennæ.

51. Brimstone.—The antennæ are short, arched, and gradually thickened towards the tip, which points downwards: the costal margin of the fore wings is straight in the middle, but sharply arched at the base and tip; each of the wings has one sharp angle; the fore wings at the tip, the hind wings about the middle of the hind margin. The colour of all the wings is bright canary yellow in the male, pale greenish yellow in the female; near the centre of each wing is a small saffron-coloured spot.

Varieties.—This familiar species is subject to variation of a particular kind: streaks or dashes of vivid orange make their appearance in different parts of the wing, and these frequently do not correspond on the corresponding wings: the colour thus irregularly occurring exactly resembles that which obtains uniformly on the disk of the wings of the Continental species, *Rhodocera Cleopatra.*

Life History.—The eggs are laid singly, about the middle of April, on the twigs of the two buckthorns (*Rhamnus frangula* and *catharticus*), the only shrubs on which the caterpillar is known to feed. In the neat hedgerows so common in this country, composed of a mixed growth of whitethorn, blackthorn, oak, maple, hazel, dogwood, and an occasional plant of buckthorn, it is very interesting to watch the female Brimstone hovering about the hedge, and selecting, with the most unerring instinct, the twigs of buckthorn, though infinitely rarer than either of the other shrubs, and depositing her eggs on these and these only; the eggs are elongated and of a bright yellow colour; they hatch in about fourteen days; thus the 1st of May may be considered the earliest day for disclosure, but the periods both of oviposition and of emergence frequently extend over three weeks, or even a month, so that during the month of June we find caterpillars varying greatly both in size and age; nevertheless, generally speaking, the caterpillar is full grown at the end of June, and then rests in nearly a straight position on the leaves or twigs of the buckthorn. Its head is small, decidedly narrower than the second, and still narrower as compared with the third, fourth, and following segments; the body is widest at the fourth and fifth segments, and thence gradually tapers to the caudal extremity: it is very convex on the back and transversely wrinkled, slightly dilated at the sides below the spiracles, and rather flattened on the ventral surface; the transverse wrinkles divide the back into sections, of which every sixth is just double the width of either of the others; each segment has one wide and five narrow sections. The colour of the dorsal surface of the head and body is dull apple-green, much resembling the leaf of its food-plant, but densely covered with extremely minute black warts, each of which

emits a small, short, and slender, white bristle; the lateral dilatation is glaucous-green, terminating in a slender waved white stripe; the spiracles are very pale; the ventral surface, legs, and claspers are semi-transparent apple-green; the minute points are present, but are much fewer, and therefore do not communicate the same dull colour to the ventral which is observable on the dorsal surface. About the 18th of June the caterpillar lightly covers the back of a leaf, or one of the twigs of its food-plant with a carpet of extremely delicate white silk, and to this it attaches itself by the anal claspers, forming also a belt or loop, the two extremities of which are firmly fixed, close together, to the silken carpet at the distance of a third of an inch from the anal claspers; this loop passes over the back of the caterpillar, supporting it equally well whether on an erect twig or the horizontal under surface of a leaf: this arrangement being completed, the lateral plates of the head separate, and the skin of the back is partially ruptured, a green pointed protuberance making its appearance through the aperture; this green protuberance performs a slow but constant circular gyration, and at every gyration the skin of the caterpillar recedes towards the anal extremity, leaving more and more of the enclosed CHRYSALIS exposed: when the moult is complete, the shrivelled skin remains at the anal extremity. The chrysalis is pointed at both extremities, but has a dorsal thoracic hump, and a large, bulging, rounded mass in front, which comprises the wing-cases; it has also three ridges —one medio-dorsal, extending from the pointed head to the anal extremity; the others lateral, and bounding the dorsal area; these latter are produced into an obtuse angle at the insertion of the wing-cases, and at these angles the diameter of the chrysalis is greatest, and diminishes thence rapidly to the pointed head, and gradually to the anal extremity; the lateral outline is, however, slightly incurved behind the thorax; the three ridges are very inconspicuous. The colour of the chrysalis is bright apple-green; the head and thoracic angles are tipped with purple-brown, this colour extending from the head towards the thoracic hump, and from the thoracic angle towards the tail; the bulging mass containing the wing-cases is so transparent that the outline of the body may be seen beneath it; the dorsal ridge is darker than the ground colour, forming a narrow, indistinct, smoke-coloured, medio-dorsal stripe; the lateral ridge is paler than the ground colour, and forms a narrow, rather indistinct, whitish stripe on each side of the chrysalis. The chrysalis state lasts for twenty days; the earliest examples, those from eggs laid on the 15th of April, may be expected to appear on the wing on the 15th of July. The sexes always keep apart during the remainder of the year, never taking the slightest notice of each other; and both sexes enter on a state of semi-hybernation very early, but are frequently tempted abroad by mild as well as sunny weather: in March they reappear, and the usual attention of the sexes takes place, followed by the deposition of eggs as already described: the butterfly life of this species sometimes lasts for an entire year, the faded butterflies of one year actually surviving until those of the ensuing year are on the wing: those, however, which appear in spring, although tolerably perfect, never have the exquisite freshness and beauty which they possessed when disclosed in the autumn; and although individuals of two consecutive years may often be seen together, the eye of the experienced entomologist will not fail to detect the difference.—*Newman.*

TIME OF APPEARANCE.—Caterpillar in May and June; chrysalis in July; butterfly chiefly in July and August, but to be seen every month in the year.

Obs.—All the English students of entomology commence their career by considering the vernal hybernated individuals of the Brimstone to be the descendants of the autumnal ones: this very pardonable mistake was discussed at great length in the "Zoologist" for 1855 and 1856.

LOCALITIES. — Woods, lanes, and gardens. Mr. Birchall says that it occurs at Killarney, but is apparently confined to the south of Ireland; and the Hon. Emily Lawless

informs me it is abundant at Kylemore Lake, in Connemara, and that she captured a pair at Clydach, on the east shore of Lough Corrib. It has not been observed in the Isle of Man or in Scotland. In England it is very generally distributed, but is rather a southern than a northern species. The following notes on the subject are interesting :—

Cumberland, Northumberland, and Westmoreland. The reports from these counties omit the species altogether; but Mr. Stainton gives the letters *L. D.* thus in italic capitals, which, at page 9 of the "*Manual*," he explains as meaning that the insect has occurred in the Lake District of Cumberland and Westmoreland ; but it is not found there every year.

Dorsetshire. Glanville's Wooton; it has nearly disappeared : buckthorn is very rare with us—*J. C. Dale.*

Durham. Single specimens have been taken at Darlington, but neither species of buckthorn grows in the northern parts of the county—*W. Maling ;* once at Darlington ; probably its extreme northern locality, as the food-plants of the caterpillar, *Rhamnus catharticus* and *R. Frangula*, although not rare in Yorkshire, barely reach the southern parts of Durham—*George Wailes.*

Cornwall. Everywhere in the county—*Stephen Clogg ;* plentiful in woody vales in the neighbourhood of Plymouth, and in similar places throughout Devon and Cornwall—*J. J. Reading ;* "South limit of *Rhamnus catharticus*, in (Devon ?) Dorset, Wight, Kent" —*H. C. Watson*, "*Cybele Britannica*," vol. i., p. 273 ; "South limit of *Rhamnus frangula* in Devon, Isle of Wight, Kent"—*H. C. Watson*, at page 274 of the same work ; "the south limit of *Rhamnus frangula* may perhaps be extended to Cornwall, on the authority of F. P. Pascoe"—*H. C. Watson*, at page 404 of vol. iv. of the same work. Probably no English county has been better botanised than Cornwall, and yet there is no record of the common buckthorn having occurred there, and only one of the rarer species. I introduce this observation, because it is anomalous for a butterfly to occur plentifully where its food-plant is absent, or excessively rare.

Family 10.—Swallow-tails (in science *Papilionidæ*).

The caterpillar is smooth and cylindrical ; it has a bifid organ in the neck, which it can protrude at pleasure. The chrysalis is girted and attached by the tail ; its head is eared or bifid. The butterfly has rather long, straight, and clubbed antennæ, and tailed hind wings.

Obs.—I have absolutely no knowledge of the extent or contents of the family *Papilionidæ* or the genus *Papilio*, nor can I form any satisfactory notion of what would be considered the essential characters of either. My readers will, therefore, kindly accept my brief characters as applying only to the single species with whose life-history I am familiar. Dr. Horsfield, certainly the most learned author on the Pedunculated Lepidoptera with whose works I am acquainted, combines the twenty-one genera differentiated by Hubner into one genus—*Papilio*. He divides his chilognathiform group, corresponding in a measure with my vermiform Order, into two sections which he calls A and B. A comprises the English genera—*Rhodocera*, *Colias*, *Pieris*, and *Aporia ;* and B combines the doubtfully British *Doritis*, with *Papilio Machaon.*

52. Swallow-tail.—The costal margin of the fore wings is decidedly arched, the tip pointed, but not sharply so, and the hind margin slightly waved ; the hind margin of the hind wings is scalloped and tailed. The ground colour of all the wings is yellow, but a large portion is occupied by black markings, which again are powdered with yellow scales; all the wings have a black blotch at the base and a broad hind-marginal band of the same colour : all the wing-rays are black, and on the costal margin of the fore wings are three squarish black blotches ; in the black hind-marginal band of the fore wings is a series of eight yellow oblong spots, and in the hind-marginal band of the hind wings is a series of six blue clouds and two series of yellow crescents, six in each ; the outer part of these occupy the extreme hind margin : at the anal angle of the hind wings is a conspicuous round red spot, the upper edge of which is adorned

52. Swallow-tail (*Papilio Machaon*).

with purplish scales, and the red is almost enclosed in a black circumscription.

Obs.—At page 340 of the first volume of the "Entomologist," Mr. Gaze has given us so graphic an account of the early life of this beautiful butterfly that I prefer transferring it entire, as a prelude to my own description of the caterpillar and chrysalis from life.

Life History.—"Having in the spring of 1840 obtained a number of chrysalids from Burwell-sedge Fen, near Newmarket, Cambridgeshire, a male and female emerged from them on the morning of the 27th of May, and were left near each other on the window-blind to expand and dry their wings; on my return from a short walk I was agreeably surprised to find them *in coitu*, and, having a fine plant of the marsh hog's fennel or milk parsley (*Peucedanum palustre*), growing in a garden pot, I placed it in the window of the room, and confined the female on it, as well as I could, with the window-blind. On the 20th she had deposited fourteen eggs, but appearing nearly exhausted I supplied her with a little moistened sugar in a teaspoon, at the same time uncurling her trunk with a pin: she seemed to enjoy her feast, and being left with the sash raised about an inch for the admission of air, made her escape. The plant was returned to its place in the garden with the eggs attached; they were of an oval shape and of a pale green colour, but changed in a few days to steel-blue, and, before the exclusion of the caterpillar, to black. The first caterpillar was hatched on the 10th of June, and the others on the following day; they were at first black and spiny, with a light-coloured patch in the middle of the back. The shell of the egg was, in every instance, the first meal of the caterpillars, and the cast-off skin was always first eaten after every change, which took place on the 18th and 26th of June, and the 3rd and 13th of July, when they had completely stripped the plant. At every change of skin the caterpillars acquired more of their brilliant colours, and when full-fed altogether looked very beautiful, and if touched darted forth their retractile horns, scenting the garden very powerfully to some distance. Not being able to get a fresh supply of the food-plant I placed some carrot-leaves in a small jar of water, and introduced them amongst the stalks of the *Peucedanum*. Contrary to my expectations, the caterpillars fed on the carrot-leaves without any apparent reluctance, and by the end of the month were full-fed. Up to this time, although left in the garden day and night, they never quitted the food, but now it was impossible to keep them on it; and after one had been finally lost the others were removed into the breeding cage, where they passed into the chrysalis state on the 30th and 31st of July and the 2nd of August. The first butterfly was produced on

the 14th of June, 1841, and ten more in the course of a fortnight. One died in the chrysalis state and one continued in that state until this day, the 10th of May, 1842, when a very fine and perfect female made her appearance. I tried very much to continue the brood, but was unsuccessful."

The full-fed caterpillar ascends the reed stems, generally so abundant in its natural haunts, and often remains stationary in a perfectly straight position. The head is narrower than the second segment, and very decidedly narrower than the following segments: its position is prone, and it is slightly notched on the crown: the body is stout and cylindrical, but has the divisions of the segments strongly marked; the second segment has a transverse dorsal slit, from which the caterpillar can protrude at pleasure, but more particularly when annoyed — a yellowish divaricating process with the use of which I am quite unacquainted, and will therefore copy a few lines from that inexhaustible storehouse of entomological information, the "Introduction to Entomology," by Messrs. Kirby and Spence. These learned authors introduce the subject in this way:—"I shall next beg your attention to those insects that emit their smell from particular organs. Of these, some are furnished with a kind of scent-vessel, which I shall call *osmateria*, while in others it issues from the intestines at the ordinary passage. In the former instance the organ is usually retractile within the body, being only exerted when it is used: it is generally a bifid vessel, something in the shape of the letter Y. . . . A similar organ, half an inch in length and of the same shape, issues from the neck of the caterpillar of the Swallow-tail butterfly. 'When I pressed this caterpillar,' says Bonnet, 'near its anterior part, it darted forth its horn as if it meant to prick me with it, directing it towards my fingers, but it withdrew it as soon as I left off pressing it'; this horn smells strongly of fennel, and probably is employed by the insect, by means of its powerful scent, to drive away the flies and ichneumons that annoy it," Vol. ii., p. 242. And again:—"In a former letter I gave you a short account of the remarkable Y-shaped, as it should seem, scent-organ of the beautiful caterpillar of the Swallow-tail butterfly: I will now speak of it more fully. It is situated at the anterior margin at the back of the second segment, close to the head, from which, at first view, it seems to proceed. At the bottom it is simple, but divides towards the middle, like the letter Y, into two forks of a fleshy substance, which it can lengthen, as a snail does its horns, to five times their ordinary extent, or retract them within the stalk so as wholly to conceal them. Sometimes it protrudes one fork, keeping the other retracted; and often withdraws the whole apparatus for hours together under the skin, and its place is only marked by two tawny-coloured dots, so that an ordinary spectator would not suspect the existence of such an instrument," Vol. iii., p. 149. Dr. Horsfield, in his "Catalogue of Lepidoptera in the Museum of the East India Society," represents the caterpillar of *Papilio Xuthus* with a similar appendage; indeed, it is extremely probable that many of the beautiful insects which now constitute that strange assemblage known as the genus *Papilio* may be found to possess it.

The surface of the skin is velvety, but every part emits very short stiff bristles, which are only rendered conspicuous by means of a lens, and then will be found to abound on the head and on the twelfth and thirteenth segments. The colour of the head is yellowish green, with a black spot above the mouth, two longitudinal black stripes down each cheek, and an oblong black spot between them, which includes the ocelli; there is a similar oblong black spot immediately above the mouth. The ground colour of the body is a most delicate and lovely green: the second segment has three oblong black spots immediately behind the head and in front of the scent-organ already described; the interstices between the segments are velvety black and unspotted, forming twelve transverse bars, and alternating with these are as many velvety transverse black bars, each being interrupted by six bright orange spots, except on the second segment, which has the black band unspotted,

and the thirteenth segment, which has the place of the band supplied by a transverse series of four roundish black spots, and no orange spots: the spiracle, when present, is situated immediately above the outer or lower orange spot; on each side the caterpillar there are three roundish black spots, forming a triangle above each of the ventral claspers: the ventral surface is pale, and more inclined to glaucous green than the dorsal, and is adorned with a medio-ventral series of oblong black markings. In a state of nature the caterpillar feeds not only on hog's fennel (*Peucedanum palustre*), but also on cow parsnep (*Heraclium sphondylium*): in gardens I have found it feeding on rue; and in confinement it thrives on the leaves of carrots, as observed by Mr. Gaze. When full fed it ascends the reeds in the neighbourhood of its food-plant, and, assuming a vertical or ascending position, fastens itself to the reed-stalk by its anal claspers, and also by a belt round its body, and then turns to a CHRYSALIS of a uniform pale dull yellow-green colour, the anterior extremity having four lobes or protuberances ranged in a transverse series, the exterior ones much larger than the others; the thorax has also three distinctly pronounced prominences, one on each side, the third dorsal and median.—*Newman.*

TIME OF APPEARANCE.—The caterpillar feeds during a greater part of the summer, and turns to a chrysalis in the autumn, and in this state remains throughout the winter; the butterfly appears in the following spring, and a succession of specimens occur during the summer.

LOCALITIES.—*Machaon* is unrecorded as an inhabitant of Ireland, Scotland, or the Isle of Man. In England it seems to have been formerly widely and plentifully distributed, for independently of the single captures mentioned below, all of which may be supposed to have been insects purposely liberated, we have the most reliable evidence that it was "common" in several parts of Dorsetshire; that it "used to be taken" in Glamorganshire; that it was taken "plentifully" in Hampshire; that it was "repeatedly found" at Tottenham in Middlesex, and at Battersea-fields in Surrey. Haworth says, "I know it breeds near Beverley in Yorkshire;" and the concurrent evidence of many entomologists prove that it was "formerly taken" in the Isle of Wight. From all these counties it seems to have disappeared, and it can now only be sought for with any prospect of success in the counties of Cambridgeshire, Huntingdon, Norfolk, and perhaps Suffolk.

Cambridgeshire. At p. 527 of the first volume of the "Entomological Magazine" we are told by Mr. Stephens that the caterpillar was found in various stages of growth on the 29th June at Sedge-fen, and on the 4th and 5th July at Whittlesea-mere—by *Mr. W. Christy;* Ely—*Marshall Fisher;* it was formerly plentiful in Horning and Wicken-fens—*F. Bond;* it is still common in Wicken-fen—*Thomas Brown.*

Cumberland. One was taken at Gilsland, about fifteen miles from Carlisle, but whether it had been bred and escaped, or how it came there, I cannot tell—*J. B. Hodgkinson.*

Derbyshire. Two specimens near Matlock.—*Thomas Lighton.* The late Mr. John Wolley afterwards explained, at p. 944 of the third volume of the "Zoologist," that he turned out many hundreds of this butterfly in the springs of 1843 and 1844, most of them at Matlock.

Dorsetshire. In plenty, formerly at Glanville's Wootton, but none have been taken since 1816; at Charminster by Mr. John Garland; at Hazlebury Common by the late Mr. H. Seymour; and near Cranborne by the late Rev. A. Storey—*J. C. Dale.*

Essex. Saffron Walden; supposed to have been brought to the neighbourhood in the chrysalis state—*W. R. Jeffrey.*

Kent. At p. 159 of the fourth volume of the "Entomologist," Mr. W. O. Hammond writes thus in October, 1868: "A young lady, a near neighbour of mine, this summer took *Machaon* in a clover-field. I believe the chrysalis of *Machaon* was put down in some numbers experimentally a few years back. These marshes are some eight miles off. Is it possible this was one? A single specimen was taken at Norrington thirty years ago by my brother."

Glamorganshire. *Machaon* used to be taken some years ago at Penclawdd and Llonghor—*J. T. D. Llewelyn.*

Gloucestershire. Bristol—*Samouelle's "Useful Compendium."*

Hampshire. A friend informed me that he possessed two specimens taken in the New Forest—*G. B. Corbin;* cowslip meadow near Lymington. It has been taken plentifully near the New Forest—*Samouelle's "Useful Compendium."* I saw to-day a specimen of *Machaon* taken on the 8th July in the New Forest—*Walter J. Wilkinson.*

Huntingdonshire. Yaxley-fen, Holme-fen, &c., years ago—*F. Bond.*

Lancashire. A specimen of this insect was found in this neighbourhood on the turnpike road, and was brought to me alive and in good preservation this day—*R. J. Shields*, 24th July, 1856—"*Entomologists' Weekly Intelligencer,*" Vol. i. p. 139.

Norfolk. Horning and other fens—*C. G. Barrett;* once in Aldeby Marshes—*W. M. Crowfoot;* Norfolk Broads—*W. H. Draper.*

Middlesex. I have repeatedly found the caterpillar feeding on rue in a garden in the occupation of some friends of the name of Forster on Tottenham Green: this was probably fifty years ago—*E. Newman.*

Suffolk. The family of a clergyman residing near Ipswich, told me they had taken *Machaon* on the banks of the Stour—*H. H. Crewe;* in 1841 three specimens of *Machaon* were taken by three different collectors at Haverhill—*W. Gaze;* on the 25th of August, 1870, Mr. Garrett of this town took a fine specimen of *Machaon* in a clover-field about a mile from Ipswich: it was perfect, with the exception of a small piece out of one wing—*Edward F. Bisshopp,*—"*Entomologist,*" Vol. v., p. 17.

Surrey. At p. 140 of the first volume of the "Entomologists' Weekly Intelligencer," we read as follows: "In the osier beds behind Beaufoy's distillery in Battersea Fields, year after year I have been accustomed to find the caterpillars of *Machaon*, and have always raised the perfect insect from them, yet, though constantly on the watch, I never once there detected it in the winged state"—*George Austin.*

Sussex. A specimen of this butterfly occurred this week near Balcombe tunnel; it was taken in his cap by a man working in the tunnel, and of course spoiled—*Eli T. Silvester,* "*Entomologists' Weekly Intelligencer,*" Vol. i., p. 197, but without date; Pulborough, Sussex Common—*Stainton's "Manual."*

Wight, Isle of. Taken in the Isle of Wight by the late Captain Bray—*J. C. Dale; Machaon* used to occur at Freshwater, but is probably now extinct—*Alfred Owen;* I never took Machaon myself, but am assured it was taken in this parish years ago—*James Pristo.*

Yorkshire. At p. 27 of the Preface to Haworth's "*Lepidoptera Britannica*" we find the following passage: "I know *Machaon*, the common swallow-tailed *Papilio*, breeds near Beverley yet, and my brother-in-law, R. Scales of Walworth, near London, possesses a specimen of it which was taken there seven years since."

Family 11.—Whites (in science *Pieridæ.*)

The caterpillar is cylindrical, transversely wrinkled, and beset with very short hairs. The chrysalis is girted and attached by the tail; its head is pointed. The butterfly has distinctly clubbed antennæ, and rounded hind wings which are never tailed.

53. Wood White.—The body is very long and slender; the wings are rather long and narrow, rounded at the tip, and plain round all the margins: the colour of the upper side is white, with a nearly square spot at the tip: in the female this spot is indistinct or absent. On the under side the basal half of the fore wings and the whole of the hind wings are clouded with faint greenish gray; this colour forms two indistinct and imperfect transverse bands.

Varieties.—There is a pure white variety with a round dusky spot at the tip of the fore wings, which occurs very rarely, and only in the south of England; it is more common in the south of Europe: the ordinary autumnal specimens are paler and smaller than the vernal ones: the wing-rays also,

where they unite with the hind margin, are tinged with smoky black in the type, but not in the variety, which is apparently the *Diniensis* of Continental entomologists.

Life History.—At page 210 of the third volume of the "Entomologists' Monthly Magazine," Mr. Hellins has published the following "Notes on the Transformations of *Leucophasia Sinapis*;" and although I cannot do otherwise than feel regret that I have never

53. Wood White (*Leucophasia Sinapis*). Upper side. The upper figure is the Male: the middle figure the variety *Diniensis*: and the lower figure the Female.

Under side of Male.

had the good fortune to possess materials for a life-history of the species from nature, that regret is more than compensated by the pleasure and advantage of obtaining the details from so trustworthy an authority:—"The eggs seem to be deposited singly; in shape they are cylindrical, very long, standing erect on one end, the upper end coming to a point, which is curved a little on one side (reminding one somewhat of the shape of a cucumber), ribbed longitudinally, about four ribs appearing in any one view: colour, a glistening yellowish white. The caterpillar, when full grown, is about three-quarters of an inch in length; the head is globular, and rather smaller than the second segment; the body is cylindrical, tolerably uniform in bulk, but tapering very gradually towards the tail, the anal flap terminating squarely, and beneath it there are two very small blunt points; the skin is wrinkled, with six folds to each segment, covered uniformly, but not densely, with very fine short whitish down. The colour is a beautiful green, the anterior segments being minutely dotted with black; the medio-dorsal stripe is dark green, edged with yellowish green: the spiracular stripe is distinct, and of a fine clear yellow, edged above with darker green; the spiracles are undistinguishable, the ventral surface and legs are translucent green. When the caterpillar is about to spin, it fastens itself, with the head upwards, to a stem of its food-plant by a little webbing at the head and the tail, and a thread round the fore part of the body, and at first it rests quite flat on the stem: after some hours, it raises its back and bends itself into a bow, the head and tail still fastened to the stem, and the thread round the body being much stretched; in this position it remains about two days, when it casts its skin for the last time (the threads which fasten down the head apparently being attached only to the caterpillar skin), and becomes a chrysalis. The chrysalis, when arrived at its full colour, is very beautiful. In shape it is slender, very acutely pointed at the head, not so acutely at the tail, the wing-cases projecting in a swelling curve to nearly twice the width of the body, and meeting in a blunt ridge; the head is thrown back, and the chrysalis rests with the wing-cases touching the stem, fastened by the tail and the thread round the body. The skin is semi-transparent, the colour a lovely delicate green, the abdomen rather yellowish; just in the spiracular region there runs all round the body a stout pink rib,

enclosing the greenish spiracles; from this a strong pink line branches off, bordering the outer edge of each wing-ease; and the wing-rays themselves are delicately outlined in pink. I received some eggs on August 2nd, and again on September 1st. The caterpillars appeared respectively on August 8th and September 6th; full fed on September 26th and November 8th; in chrysalis September 29th and November 8th. The food chosen was either the tufted vetch (*Vicia cracca*), or the tuberous-rooted bitter vetch (*Orobus tuberosus*), but not both.—*Hellins.*

Time of Appearance.—May and August.

Localities.—It is to be seen languidly flying along the roadways and pathways in woods, rarely entering the umbrageous shelter of a wood, and as rarely venturing into open country. I have never seen it settled, and one of our oldest entomological authorities has made the same observation. At Darent Wood, in Kent, I have often watched its characteristic flight: one specimen will make its appearance, approach as it were on wearied wing, and if unmolested, pass by and go on out of sight; in a few minutes another will appear at the same spot, will follow the exact course of the first, and press onward in the same direction, and so on during the whole of a summer's morning, each seemingly bent on the performance of some inexorable duty, in which, however, dispatch or hurry was totally out of the question. In Ireland it seems very irregularly distributed. Mr. Birchall says it is abundant near Galway and at Killarney, but has not been noticed in Ulster or Leinster. The Hon. Emily Lawless says it is not uncommon at Florens in the county Galway, and that it has also been taken at Dunsandle and other places in the neighbourhood of Athenry. It has not been recorded as occurring in the Isle of Man or in Scotland. In England and Wales it is of frequent, and sometimes of abundant, occurrence.

Berkshire. At Burghfield, near Reading—*C. S. Bird.*

Cornwall. Launceston—*W. H. Hayward.*

Cumberland. Very rare; only occasional specimens have been taken at Barron Wood and Newbiggin Wood. I have heard that it is more frequent about Ullswater in the Lake District—*J. B. Hodgkinson.*

Devonshire. Plym-bridge, Shaugh-bridge, Berry Pomeroy, Torquay, Exeter, Axminster, Chudleigh, Buckfastleigh — *J. J. Reading.* This elegant butterfly has been extremely abundant during the latter part of last month (May), and up to the present time (June 13), in the neighbourhood of Ipplepen, South Devon. It does not appear to be confined to any particular locality, or to its usual resort of woods, being generally distributed, and occurring in almost every lane and hedge-row in this neighbourhood — *F. Wilkinson,* in "*Entomologist,*" Vol. v., p. 114.

Dorsetshire. Glanville's Wootton, Parley, Lulworth—*J. C. Dale.*

Essex. Single specimens have been recorded from several localities.

Glamorganshire. One specimen at Llantrissant—*Evan John.*

Gloucestershire. Rather scarce in the paths in woods, in lanes, &c., in Alderley Down Woods—*V. R. Perkins;* Dursley and Grange Court—*Joseph Merrin.*

Hampshire. New Forest, &c., &c.

Herefordshire. One specimen at Grantsfield, near Leominster — *Mrs. Hutchinson;* Briarly Wood, Eton Wood—*E. Newman.*

Huntingdonshire. Monk's Wood — *F. Bond.*

Kent. Blean Wood—*H. A. Stowell;* I have occasionally taken it near Sturry and near Tunbridge Wells—*W. O. Hammond;* formerly very common in Darent and Birch Woods—*E. Newman.*

Lancashire. Abundant at Grange—*J. B. Hodgkinson;* common in the county on the north side of Morecambe Bay—*T. H. Allis;* Silverdale—*James Murton.*

Monmouthshire. Scarce, and only taken in St. Julian's Wood—*George Lock.*

Northamptonshire. Peterborough — *F. Bond;* near Towcester — *Hamlet Clark;* Barnwell Wold in May, but not common—*William Bree.*

Nottinghamshire. A single specimen has been taken at Newark—*George Gascoyne.*

Staffordshire. Swinnerton Old Park—*T. W. Daltry.*

Suffolk. Brandeston and Playford—*Joseph Greene;* Stowmarket and Bentley—*H. H. Crewe.*

Surrey. Common at Haslemere—*C. G. Barrett.*

Sussex. Bolney Wood — *W. Buckler;* Frenchlands Woods, Ashington—*J. H. White;* Abbot's Wood, near Hailsham: the first brood in May, the second in August—*C. V. C. Levitt.*

Westmoreland. Abundant at Witherslack, and not rare at Windermere—*J. B. Hodgkinson.*

Wight, Isle of. Near Brading, but rare in the Isle of Wight—*F. Bond;* Quarr Copse and Appledurcombe Parks—*Alfred Owen;* very local in the Isle of Wight: I only know of one locality, at Whippingham—*James Pristo.*

Wiltshire. *Sinapis* has been taken in Savernake Forest and Rabley Copse; also at Great Bedwyn, but very rarely—*T. A. Preston;* common at Wilton, near Salisbury—*W. H. Grigg.*

Worcestershire. It occurs sparingly in all the woods in which I have collected—*J. E. Fletcher;* formerly plentiful at Great Malvern, but not so now; the second brood is less abundant than the first—*W. Edwards;* Bromsgrove—*W. H. Draper.*

From the careful county lists, kindly transmitted me from Cheshire, Derbyshire, Hertfordshire, Lincolnshire, Middlesex, Norfolk, Shropshire, Somersetshire, and Warwickshire, the name of *Sinapis* is absent: a fact not proving, perhaps, the absence of the insect, but showing certainly that it is not common.

54. Orange-tip. — All the wings are rounded, and the costal margin of the fore wings is slightly arched: the colour is white, with a dark gray tip and a central black spot. In the males there is a large patch on each fore wing, extending from the gray margin to the central spot, and occupying about half the wing, of a most brilliant orange red: in the female this is wanting, but the dark gray tip

54. Orange-tip (*Anthocharis Cardamines*). Upper side of Male, Upper side of Female, Under side of Male.

and central spot are larger and more conspicuous in that sex than in the male; the central spot in the female is also decidedly crescentic. The under side of the fore wings in the male has the orange-coloured blotch narrower than on the upper side, and the gray colour assumes the form of a hind-marginal band, and is sprinkled with minute yellow scales, which impart a greenish hue to this part: the under side of the hind wings in both sexes is exquisitely tesselated with smoky-gray spots on a white ground, the gray portions of the wing being powdered with yellow, which communicates to them a greenish tint.

Varieties.—I have a specimen of this butterfly in which the whole of the ground colour is a beautiful canary yellow, and I believe there are several others. Abnormities, in which the orange blotch occurs on only one of the fore wings, or only on the upper side or under side, sometimes occur; they find great favour in the eyes of collectors.

Life History.—The female lays her eggs

on hedge garlic (*Erysimum alliaria*), dame's cress (*Hesperis matronalis*), tower mustard (*Turritis glabra*), winter cress or yellow rocket (*Barbarea vulgaris*), and occasionally on lady's smock (*Cardamine pratensis*), as stated by Mr. Doubleday, who observes, with his usual care, that in this instance the greater part of the caterpillars must perish when the meadows are mowed, as the plant is cut down with the grass before they are full-fed: it is very probable also that other species of cruciferous plants are occasionally selected in the absence of those mentioned above, but I know of no others which have been noticed in England. When the young CATERPILLAR emerges from the egg it makes its way up the flowering-stalk, and as soon as the pods have formed begins devouring them: at first it requires but little food, and the pods, growing with great rapidity, fully keep pace with its requirements, and furnish an abundant supply. It is curious to observe with what pertinacity these caterpillars, in confinement, select the pods and neglect the leaves of these plants, and, having watched their proceedings with great attention, I have fancied they devoured the seeds with peculiar relish: sometimes a pod will be pierced exactly over each seed, and the seeds themselves consumed, the pod being neglected until the supply of the more favourite viand had failed. When full-fed, which is during the first week in July, the caterpillar rests in a nearly straight position on the stalk or seed-pod of its food-plant: the head is then of exactly the same breadth as the second segment, and the body of nearly equal breadth throughout, but slightly attenuated towards the anal extremity, which is rounded; the dorsal surface is convex, transversely and regularly wrinkled, the wrinkles dividing each segment into sections; the sides are slightly dilated below the spiracles, and the ventral surface slightly flattened; every part of the head and body is beset with minute warts, and each wart emits a short bristle. The colour of the head and body is opaque glaucous green, this colour on each side of the body fading through pale glaucous green into white, the extreme margin of the lateral dilatation being pure white, and constituting a lateral stripe which has its upper or dorsal margin very indistinctly defined, but its lower or ventral margin abrupt and well marked; this white stripe encloses the very pale spiracles, and extends the entire length of the caterpillar, commencing at the ocelli close to the mouth, and terminating at the rounded extremity of the anal flap; the ventral surface, legs and claspers, are dark apple-green; the warts on the dorsal surface are intensely black, and also many of those on the sides and ventral surface, but in these regions there occur white warts also, more especially within the white lateral stripe; the bristles which they emit are black on the dorsal and generally black also on the ventral surface, but on the lateral stripe they are mostly white. In July the caterpillar ascends the stem of its food-plant, and, fastening itself thereto by a belt round the middle, changes to a crescent-shaped CHRYSALIS of very eccentric appearance, both extremities being elongated and pointed, and the anterior elevated in the air, the posterior firmly attached by a series of minute hooks to a silken film, previously spun on the stalk of the food-plant; the back is concave, the wing-cases protruding and forming a semi-circular arch in the centre of the ventral surface; the colour is pale dingy green, approaching to wainscot-brown: in this state it remains throughout the winter.—*Newman.*

TIME OF APPEARANCE.—May.

LOCALITIES. — Meadows and lanes everywhere in the three kingdoms, as well as in the Isle of Man. Mr. Birchall says it was common in May, 1860, and that he observed it in myriads at Sligo, reminding him of the migrating clouds of tropical *Callidryas;* Mrs. Battersby says it is very common in Ireland, and Mr. Fetherstonhaugh that it is abundant in the counties of Dublin and Mayo: according to Dr. Buchanan White, it is widely distributed in the lowland part of country, and occasionally is rather common: it has not been found north of Forres; the dates on which Dr. White has taken it in Perthshire are as follows—In 1858, May 15;

1859, May 14; 1860, May 24; 1866, May 2; and 1868, May 16. Dr. White has taken it in Kircudbrightshire in June and July, also in Fifeshire and Morayshire; Mr. Wailes, in his "Northumberland and Durham Catalogue," observes:—"This beautiful butterfly is generally distributed over the two counties, frequenting damp places in fields, lanes, and woods, during May and June, where the principal food-plant of the caterpillar—*Cardamine pratensis*, of which it devours the seed-vessels—occurs. This year, 1857, on the 4th June, in the vicinity of Callaly, I observed its simultaneous occurrence in great numbers throughout that district, when not a single specimen was to be seen the day before." Mr. Wailes adds this curious observation:—"The usual expansion of the wings is one inch and eight lines to one inch and eleven lines, but in the year 1832 none exceeded one inch and three lines; and so marked was the difference all over the country, that many were inclined to consider the specimens as those of a distinct species. The following season there was no departure from the normal size." In Gloucestershire this variation in size has been noticed by Mr. V. R. Perkins both in male and female. The name does not appear in a list from Lincolnshire, most kindly sent me by the late Thomas Henry Allis very shortly before his last illness: it is the only county list from which it is totally absent; but if I understand Mr. Jenner Fust's paper on the "Distribution of Lepidoptera in Great Britain," he has an authority for the occurrence of *Cardamines* in that county.

55. Green Chequered White.—The fore wings are blunt, but scarcely rounded at the tip; the hind margin of all the wings is simple. The colour is white, the fore wings having a broad blotch of smoky-black at the tip, and in this are four squarish white spots; there is a double transverse and rather oblique smoky-black spot above the middle of the costal margin, descending nearly to the middle of the wing, and a smaller round black spot near the anal angle: the hind wings are somewhat clouded with smoky-black, more particularly a transverse band parallel with the hind margin, and there are usually four or five arrow-heads still nearer the hind margin, which, by their stems, are united to this band. On the under

55. Green Chequered White (*Pieris Daplidice*). Upper side of Male and Female.

Under side of Female.

side all the markings of the upper side are not only present on the fore wings, but distinctly defined, and are of a yellowish green colour, minutely sprinkled with black: the hind wings are beautifully tesselated with greenish markings, as represented in the lowest figure of the three.

Life History.—The egg is laid on the two species of wild mignionette (*Reseda lutea* and *R. luteola*) in April or May, and again in August or September, there being two broods

in the year, the second of which passes the winter in the chrysalis state. The head of the CATERPILLAR is rather narrower than the second segment of the body, and when at rest is partially withdrawn therein; the body is uniformly cylindrical, the segments being perceptibly but not strongly marked. Its entire surface is covered with scattered warts, each of which emits a hair: the colour of the head is bluish gray, with a longitudinal yellow mark on each cheek; the body is of the same bluish gray colour, with four yellow stripes, two of which, rather broader than the others, are dorsal and commencing at the head, where they unite with the two yellow marks already noticed, terminate on the thirteenth segment; the other two stripes are lateral in the region of the spiracles; the warts are black. The CHRYSALIS is attached by a belt, and also by anal hooks; the head is pointed; the thorax is keeled, and the sides keeled and angulated; the colour is pale brown, with several spots of darker brown or black on the body.—*Hubner's figures.*

TIME OF APPEARANCE.—May and August. The August specimens only are taken in this country.

LOCALITIES.—Unrecorded as an inhabitant of Ireland, Scotland, or the Isle of Man. In England it seems to be almost entirely confined to the coasts of Kent and Sussex opposite the northern coast of France. A theory broached by myself very many years ago, and severely ridiculed by many of our entomologists, under the name of the "blown-over theory," suggested that we may be indebted to winds, or the migratory propensity of insects, for the few specimens taken in this country of such species as *Chærocampa Nerii, Lampides bætica, and Pieris Daplidice.* This theory may, I think, fairly challenge investigation, notwithstanding the unquestionable fact to be presently adduced of the species having been raised from the egg in this country. I believe it is generally safer to investigate a theory based on long experience than to dismiss it as unworthy of consideration. *Daplidice* has been reported from the undermentioned counties:—

Cambridgeshire. I took a fine specimen near Whittlesea Mere on the 22nd or 23rd of August, 1852, while at rest on the flower of the wild carrot—*E. C. Buxton.*

Devonshire. At p. 398 of the second volume of the "Zoologist," Mr. Lighton says, "My cabinet has lately been enriched by a specimen of *Daplidice* captured in 1836 in Roseberry Wood, near Exeter, by Mr. R. Dawson."

Essex. One was taken by Mr. Norman Halls, near Dilbridge Hall, Colchester, on the 12th August, 1857—*W. H. Harwood.*

Hampshire. Portsdown Hill—*H. H. Crewe.*

Kent. At p. 113 of the first volume of the "Zoologist," the Rev. W. T. Bree, once a great authority in entomological matters, writes thus:—"Mr. Leplaistrier, of Dover, captured last summer, near that place, two pairs of the rare *Pieris Daplidice.* One of these, fortunately, laid some eggs after it was captured, and from them Mr. Leplastrier reared the caterpillars which he fed on the wild mignionette (*Reseda lutea*), and at the present time (Feb. 8, 1843) he has four of them in the chrysalis state. The chrysalis, to my eye at least, a good deal resembles some of the *Vanessidæ*, were it not that, unlike them, it is fastened by a thread round the middle. Mr. Leplastrier's specimens were taken, I think, the end of July, or early in August, and if so, it would seem there must be two broods in the season." On the 18th of May of the same year, Mr. Leplastrier writes thus to Mr. Bree:—"I have the pleasure of fulfilling my promise, by informing you of the safe arrival of my four specimens of *Daplidice* last week, and certainly they are a splendid-looking insect, and, of course, in fine condition: there are three females and one male." Mr. Bree adds:—"The above notice may not, perhaps, be wholly without interest to your entomological readers, as it serves to point out with precision the date when this rare insect makes its first appearance on the wing."

Lyminge, six miles north of Hythe—*William Tylden.*

Margate, 1858 and 1868—(Mrs.) *Julia Cox.*

Captures near Margate, Ramsgate, Deal, Dover, and Folkestone, have frequently been made and recorded. Gravesend, one in 1870 —*D. T. Button.*

56. Greenveined White (*Pieris Napi*). Upper side of Male and Female.

Under side of Female.

56. Greenveined White.—The tip of the fore wings is blunt but scarcely rounded; the margins are simple: the colour is white with smoky-gray tips to the fore wings, and a slight blackness at the extremity of each wing-ray; there is one spot on the disk of the fore wings in the male and two in the female; these spots are nearer the hind margin than the middle of the wing: in the female also the hind wings are more or less suffused with smoky-gray, more especially along the wing-rays. On the under side the tips of the fore wings and the whole of the hind wings are yellow; the disk of the fore wings is white; the wing-rays are of the ordinary ground colour, but are bordered with black scales.

Varieties.—Mr. Buckler remarks that all the caterpillars of this insect which fed on water-cress produced very pretty varieties of the perfect insect, the usual dusky markings of the wings being of a delicate dove-gray, the bases of the wings being more than usually suffused with this tint. Mr. Stephens divided this species into three, distinguished by the greater or smaller amount of smoky-gray on the wings; he called them "*Napi*," "*Napeæ*," and "*Sabellicæ*;" but no entomologists with whom I am acquainted adopt this division.

Life History.—This butterfly is double-brooded: the eggs which produce both broods are laid on the hedge garlic (*Erysimum alliaria*), on the water-cress (*Nasturtium officinale*), on the winter-cress (*Barbarea præcox*), and probably some other species of cruciferous plants: the eggs which produce the first brood of caterpillars are deposited in April and May; those which produce the second, in July and August: their figure is that of a sugar-loaf, but beautifully ribbed longitudinally, and delicately striated transversely; they are attached by the base. The caterpillars emerge about the twelfth day, and are full-fed respectively at the end of June and middle of September, when they rest in a straight position, closely appressed to the food-plant. The head is small, decidedly narrower than the body; the body is cylindrical, but tapers slightly to each extremity; the dorsal surface is transversely wrinkled, the wrinkles dividing each segment into six sections; both head and body are beset with minute warts or points, each wart emitting a hair. The colour of the head and dorsal surface is dull and rather dark glaucous green; the ventral surface is lighter, the division between the two being very distinct, and taking place at the spiracles, which are black and enclosed in a bright yellow ring: the warts on the head are generally white, those on the dorsal surface almost invariably black, and those on the ventral surface almost invariably white; the legs and claspers are of the same tint as the body, but semi-transparent. Mr. Greening kindly supplied me with the eggs of this species, and Mr. Buckler with the full-fed caterpillars: the latter spun

a delicate web over the surface of a leaf early in July, attaching themselves thereto by the anal extremity and also by a belt passing over the body behind the thorax, and thus changed into CHRYSALIDS, having the head rather elevated and terminating in a slender point. The thorax is produced into a slender, medio-dorsal keel, angulated in the middle; the sides of the sixth and seventh segments are keeled and angulated, the seventh more prominently so than the sixth; the following segments have a medio-dorsal keel very little raised, the continuity of this with the thoracic keel is interrupted on the sixth and seventh segments. The colour is green, fading on the approach of emergence to whitish, minutely dotted with black; the keel of the thorax and the lateral keel of the sixth and seventh segments are yellow, crested with pinkish brown, the posterior angle of the latter is tipped with black. I believe that this species never feeds on the various species of *Brassica*, *Tropæolum* and *Reseda*, frequented by its congener, *Pieris Rapæ*, and I also think that the accounts of its destructive powers are entirely fabulous.—*Newman.*

TIME OF APPEARANCE.—May and August.

LOCALITIES.—Mr. Birchall reports that this butterfly is generally distributed in Ireland, and that it occurs in the Isle of Man; it seems to occur generally, but in some places not plentifully, in Scotland and England.

57. Small White (*Pieris Rapæ*). Upper side of Male.

57. SMALL WHITE.—The fore wings are somewhat arched on the costal margin, the tip being somewhat pointed, but not acutely so, and the hind margin simple and entire; the hind margin of the hind wings also is simple and entire. The colour of the wings is white, but the fore wings of the male have a smoky-gray tip, and a faint median spot of the same colour; the hind wings have an inconspicuous black spot on the costal margin. The females have a distinct dark smoky spot at the tip, and two black spots on the disk,

Upper side of Female.

one nearly circular somewhere about the centre of the wing, the other almost double, and nearer the anal angle. The under side has the tip of the fore wings and entire area of the hind wings dull ochreous yellow, the darker markings of the upper side being apparent, but indistinct.

Varieties.—A very variable species as regards the amount of black marking on the upper side of the fore wings. In some specimens, in one particularly which was sent me by Mr. Fetherstonhaugh, of Dublin, the black markings are totally absent. Mr. Stephens, grounding his characters on this difference, divided the species into two, calling the vernal specimens "*Metra*," the later or autumnal specimens "*Rapæ*." At p. 258 of the fourth volume of the "Entomologist," Mr. J. M. Bramwell describes a specimen, taken while settled on some palings near Perth, as of a uniform dusky brown colour on both sides of the wings. Lastly, there is a variety of exquisite beauty occasionally but very rarely taken in this country, of the most delicate but vivid yellow. It will be seen farther on that this variety occurs more commonly in Canada.

LIFE HISTORY.—This butterfly is double-brooded: the eggs which produce both broods are laid on all the cultivated varieties of cabbage and garden plants, the *cruciferæ*, tropæolums, and mignonette having the

preference. Those designed to produce the first brood of caterpillars are deposited in April and May, those for the second brood in July and August: the shape of the EGGS is that of a sugar-loaf, beautifully ribbed longitudinally and delicately striated transversely, the number of ribs in the specimens I counted being ten, eleven, and twelve; the number of striæ I believe inconstant; it is scarcely ever less than thirty, and these, being crowded into so small a space, are, of course, difficult to count: the eggs are attached by the base only, and always on the upper side of the leaf. The young CATERPILLARS of the first brood are hatched about the thirteenth day, and those of the second brood about the tenth day, but this depends very much on temperature; they are often observed eating the eggshell even before quitting it. Until the second change of skin the caterpillars are exactly the colour of the leaf, and semi-transparent; the hairs are conspicuous, and each has a spherical head like a pin; indeed, they much resemble so many minute pins stuck into the skin, or still more exactly those minute stalked glands which are commonly observed in the stalks of ferns and other plants. There are a number of white warts on the body much more conspicuous at this early stage than in after life; these are three in number on each side of each segment in the middle of the body, but not at the extremities. The caterpillars are full-fed in about twenty days, and this also depends on the temperature, which in this climate is proverbially uncertain during the summer season: when full-fed they rest in a perfectly straight position and with the ventral surface closely appressed to the leaf; they crawl with a gliding undulating motion, and, if removed, roll themselves in a ring—a position they rarely maintain longer than a few seconds: the head is rather narrower than the second segment, and decidedly narrower than the following segments: the body is cylindrical, but tapers gradually towards both extremities; the incisions between the segments are very indistinct, but each segment is transversely wrinkled or divided into six sections; both the head and body are beset with minute points or warts, each of which emits a short and feeble hair. The colour of the head and dorsal surface of the body is a rather dark glaucous green; the ventral surface is lighter and more decidedly glaucous. The division between the two tints occurs in the region of the spiracles; there is a narrow medio-dorsal stripe of gamboge yellow, extending from the head to the commencement of the anal flap; there is also a lateral series of bright yellow spots in pairs, the anterior spot of each pair is contiguous to a spiracle; the warts are black, with the exception of three dorsal pairs on each segment, which are white. The CHRYSALIDS are attached by a belt and also by minute hooks at the anal extremity; they are readily to be found thus attached to the woodwork in greenhouses, to wooden frames, walls, trunks of trees, and all manner of out-houses: the head is very convex beneath, and terminates in front in a very sharp point directed forwards; the thorax is produced into a slender medio-dorsal keel, angulated in the middle; the sides of the sixth and seventh segments are keeled and angulated, the seventh much more prominently so than the sixth. The following segments have a medio-dorsal keel very slightly raised on the thirteenth segment; this is divided, and the divisions spread to the bifid anal extremity. The colour of the chrysalis is very different in different specimens; the majority are of that pale whitey-brown which I have called putty colour; some are wainscot-brown; others red-brown; and others again are delicate green of different shades. The entire surface of the chrysalis is spotted, sprinkled, or striated with black. An ingenious but, I think, futile attempt, has been made to show that the colour of the chrysalis varies with the colour of the object to which it is attached.

TIME OF APPEARANCE.—Summer, from April to August, but especially abundant in May and August: sometimes as abundant as snow-flakes, sometimes scarce. In 1868 it was difficult to procure a specimen, and this fact was the subject of general observation and of many remarks in the fourth volume of the "Ento-

mologist," pp. 300, 313, 314, &c.; the scarcity seemed to extend all over the kingdom. At page 80 of the fourth volume of the "Entomologist," the Rev. T. A. Preston records the occurrence of a white butterfly on the 24th of February, and of a second on the 4th of March: it would be useless to speculate on the species, but *Rapæ* is the most probable of the three.

Obs.—At nine in the evening of the 16th July, 1868, when returning from a visit to my friend Mr. Kirchner, who has so exquisitely engraved my moths and butterflies, I saw a number of small white butterflies on a railway bank, flying from one clump of lucerne to another, and sipping the honey of the blossoms: they were doubtless of this species.

Localities.—Appears to be universally distributed throughout the United Kingdom. It is very partial to settling on damp ground. Curious instances are recorded of its following water-carts in London in swarms, and settling on the fresh watered streets.

Obs.—This butterfly is rather remarkable for the manner in which it has been observed migrating. At page 1443 of the fourth volume of the "Zoologist," I have extracted the following from the "Canterbury Journal:"—"One of the largest flights of butterflies ever seen in this country crossed the Channel, from France to England, on Sunday last (the 5th July, 1846). Such was the density and extent of the cloud formed by the living mass, that it completely obscured the sun from the people on board our Continental steamers; the decks were strewed with the insects in all directions. The flight reached England about twelve at noon, and dispersed themselves inland and alongshore, darkening the air as they went. During the sea-passage of the butterflies the weather was calm and sunny, with scarcely a puff of wind stirring; but an hour or so after they reached *terra firma* it came on to blow great guns from the south-west, the direction whence the insects came." Another newspaper account says: "On Sunday last (5th July, 1846), there was a most extraordinary arrival of white butterflies at Dover; every vessel that came into harbour had the rigging and decks completely covered with them, and the pier was so thick in butterflies that you could not walk without treading on them." At the same page of the "Zoologist," the Rev. J. Pemberton Bartlett gives the following account:—"On the 7th of July (1846), I was surprised by the very unusual number of white butterflies which appeared in our garden here, and in order to protect the rising generation of cabbages and broccoli, I commenced an attack upon them with my net. In about an hour I killed upwards of a hundred, but this not appearing materially to diminish their number, I desisted from the work of destruction. The next day they were as numerous, and I began to suspect that they had migrated, as it was difficult to account for so simultaneous an escape from the chrysalis state of so vast a number in our own immediate neighbourhood. I have since been informed that on Sunday, the 5th of July, an extraordinary flight of white butterflies arrived at Dover from the French coast. It was described as being so extensive as to pass like a cloud of snow. The decks of several vessels were covered with them; they came in a south-west direction." The distance between Mr. Bartlett's residence and Dover is ten miles.

Another and totally different instance of the colonizing or acclimating power of this butterfly will be found at page 9371 of the "Zoologist" for 1864: this paper, which is certainly one of the most valuable and interesting contributions to the science of entomology ever published, is from the pen of Mr. G. J. Bowles, Secretary of the Entomological Society of Canada, Quebec Branch; and although it is too long to transfer entire to these pages, the introductory paragraphs are of such importance in an economic and commercial point of view, that I cannot hesitate to insert them here; omitting, however, the author's valuable observations on the possible mode of introduction. "During the summer of 1863," says Mr. Bowles, "I captured, in the vicinity of Quebec, numerous specimens of a butterfly of which no description could

be found in any work on American entomology; Mr. Couper, to whom I applied for assistance, was equally at a loss to determine the species, considering it, as I did, to be indigenous to Canada. In order to solve the problem, however, we forwarded some specimens to Mr. William Saunders, of London, C.W., who pronounced them to be identical with *Pieris Rapæ*, the small white butterfly of England, one of the most common and injurious lepidopterous insects of that country. In the meantime I had enclosed a drawing of the butterfly, together with the wings, to Mr. S. H. Scudder, of Boston, from whom I received a reply stating that, after comparing the drawing and wings with specimens of *P. Rapæ* in the Museum of Comparative Geology, at Cambridge, he saw no reason to consider them distinct; at the same time he desired further investigation to be made respecting the caterpillar and chrysalis states of the insect. This investigation has been successfully carried out, and places beyond doubt the identity of the butterfly with the English *P. Rapæ*, thus establishing another instance of the transportation of a lepidopterous insect across a wide expanse of ocean, and its naturalization in a new country—an instance which, when the evidence is considered, must be regarded as the most conclusive on record. The identity of the English and Canadian species is thus proved by the exact similarity of the two insects in all their stages. That the perfect insects are alike in both sexes I have on the authority of the gentlemen above named, for in Quebec I could have no opportunity of comparing specimens taken in both countries. It is singular, too, that a curious variety of the male is common to both; in Canada, however (perhaps from the effect of a different climate), it is more frequently met with than in England. Two males of a bright canary colour, but with the usual markings of the species, were captured here last summer, one by Mr. Couper, the other by me; and this season I have already seen several similar individuals. On referring to a valuable work in the library of Parliament ('Curtis's Farm Insects,') I was gratified to find that the author mentions having in his collection a male *P. Rapæ*, 'taken near Oldham, in Lancashire, which had all the wings of a bright yellow colour.' As to the chrysalis, in size, colour, and markings it exactly agrees with engravings and descriptions of the English chrysalis, and also in its usual place of deposition, &c. The last link in the chain is furnished by the similarity of the caterpillar, which also agrees with the best English descriptions. I took several of these caterpillars from cabbage plants in hot-beds on the 8th of June, and have reared four of them to maturity. When about half-grown they began to exhibit the characteristic markings of the species, these markings becoming more decided as they increased in size. That this insect is not native to Canada is certain from two interesting circumstances connected with its history. A limit can be set to its existence in Canada, and the place where it first appeared can be specified. Until within a few years the butterfly was unknown in this country. No description of it is found in Kirby's 'Fauna Boreali-Americana,' nor in the 'Canadian Naturalist' by Gosse, who visited Quebec and collected here about 1839. The 'Synopsis of the Smithsonian Institution' is also wanting in this respect; and I have carefully examined the volumes of our magazine of natural history ('The Canadian Naturalist,' Montreal), without finding any notice of the species. This periodical contains two lists of *Lepidoptera* collected in Lower Canada, one by Mr. R. Bell, jun., of butterflies taken on the Lower St. Lawrence; the other, by Mr. D'Urban, of those found in the vicinity of Montreal in 1857, 1858, and 1859. The only *Pieris* mentioned in these lists is *P. oleracea*, a species which may be distinguished at a glance from *Rapæ*, the markings being altogether different. Mr. Couper captured a specimen of *Rapæ* within the city limits of Quebec, about five years ago, but did not investigate the subject, though considering the insect a rare one, his special study being *Coleoptera*. This is the earliest notice of the butterfly in Canada; and it evidently points

out Quebec as the locality of introduction, and fixes the period at about seven or eight years ago."—"*Zoologist*," 1864.

These highly interesting facts may reasonably excite the inquiry whether *Antiopa Atalanta*, and many other insects, have not migrated in the same way from continent to continent, and whether man may not have been instrumental, however unwittingly, in aiding the migration.

58. Large White (*Pieris Brassicæ*). Male and Female.

58. Large White.—The fore wings have the costa arched, the tip pointed, but not acutely so, and the hind margin simple and entire; the hind wings have the margin simple and entire: the colour is white, but the fore wings have a broad smoky black tip, which diminishes almost to a point on the costal as well as on the hind margin; the females have, in addition, three black spots, one of them nearly circular and nearly central, another also nearly circular between this and the inner margin; the third is club-shaped and inner-marginal, the tip of the club almost touching the second circular spot and the slender end of the club, extending along the inner margin more than halfway towards the base of the wing: the hind wings have a black spot about the middle of the costal margin. The under side has the disk of the fore wings white with a yellow-gray tip and two black spots, corresponding with those on the upper side of the female; the hind wings are dull yellowish-white sprinkled with black scales.

Varieties.—At p. 471 of the second volume of the "Zoologist," Mr. J. Plant, of Leicester, figures a variety of this butterfly with a sharply-defined black patch at the base of all the wings. At p. 258 of the fourth volume of the "Entomologist," Mr. J. M. Bramwell, of Perth, mentions that he has in his collection a curious specimen of this butterfly captured in 1868, about two miles from Perth. It is a female, and of a uniform dusky black colour, both on the upper and under sides; the black spots on the wings are quite distinct, being of a much more intense and shining black than the ground colour. I ought also to mention that Mr. Stephens, in his "Illustrations of British Entomology," makes "species" of the two broods of this

butterfly, calling the early or vernal brood "*Chariclea*," the later or autumnal brood "*Brassicæ*." The vernal brood has gray tips to the fore wings, whereas in the later brood they are black.

Life History.—The eggs are laid in May, and again in July, sometimes singly and sometimes in little clusters, varying in number from four or five to a dozen. In shape they somewhat resemble a champagne bottle which has had the upper part of its neck knocked off; they are firmly attached by means of a gummy secretion elaborated within the body of the parent to the surface of the leaf selected, which in this country seems to be almost invariably one of the cultivated varieties of cabbage. The attachment is by the base only, and the egg stands erect like a ninepin; it has twenty or twenty-two longitudinal ribs, and between thirty and forty most delicate transverse lines, which pass over the ribs themselves, as well as the interstices between them. The caterpillars of the first brood usually hatch in fifteen days, those of the second brood in ten days: they feed exactly on the spot where the egg was laid; if in a cluster they remain in company until the second change of skin, first, however, consuming the shell of the egg from which they have just escaped. The caterpillars are full fed in about a month, seldom less, the period varying in accordance with the temperature; they rest on the surface of the cabbage leaf in a nearly straight position, and if disturbed fall to the ground, bending the two extremities towards each other; but they retain this position for a short time only, and then, turning with unerring certainty to the food-plant from which they have fallen, reascend the stalk. The head is narrower than the second segment, into which it is partially withdrawn when the caterpillar is at rest; it is rough with numerous warts of various sizes, each of which emits a hair. The body is uniformly cylindrical, the divisions of the segments not being strongly marked, but yet distinctly discernible, and each segment is transversely divided into four sections in addition to a double skinfold between each two, thus imparting the idea that the number of sections in a segment is six. Each section has a series of wart-like projections of various sizes, which give a rough appearance to the surface, and each of these projections emits a hair from the summit. The colour of the head is bluish-gray, the plate above the mouth being ochreous, and the warts or projections black. There is a large black mark down the middle of the face which divides on each side of the ochreous plate already described, and also a black blotch in which are situated the ocelli on each side of the mouth. The colour of the body is bluish green, with three yellow stripes, the narrowest of which is medio-dorsal, the others lateral, and including the spiracles; these three stripes, although very obvious, have no clearly-defined margins, and seem to melt into the blue-gray ground-colour. The warts or projections are entirely black, and, in many instances, form the nucleus of a small black blotch; these, occurring only or principally on the blue-gray area, give a greater distinctness to the stripes of the caterpillar. The hairs are mostly white; the ventral surface, including the legs and claspers, is dull yellow-green. The chrysalis is attached by a belt round the waist, as well as by the anal extremity, which is forked or divided, the notch between the divisions being fringed with minute hooks. The head is pointed; the back is keeled, and rises into a sharp point in the middle of the thorax; the sides are also irregularly keeled, the keel rising into two points or lobes on each side of the body close to the margin of the wing-cases. The colour is bluish-white, abundantly sprinkled with black spots; the point of the head is yellow, the median line of the dorsal keel also yellow, but interrupted, especially at the junction of the segments, by a black spot on the body; each of these black spots encloses a smaller white spot.—*Newman.*

Time of Appearance.—May to August; particularly these two months.

Localities.—In all parts of the United Kingdom more or less plentiful. This, like the preceding species, has strong migrating propensities. At page 289 of the second volume

of the "Entomologist," Mr. Thorncroft has published the following interesting observations on the subject:—"It was a still, hot day, with hardly a breath of air, and now and then the common *Brassicæ* and *Rapæ* would lazily fly in. The flood tide set in about 3 p.m. with a gentle breeze, and then came a host of the above-named butterflies, with a few of *Napi*. There must have been hundreds arrive within a very short space of time; but what surprised my friend and me was their alighting or settling on the sea with expanded wings, and the ease with which they rose again. We saw the same butterfly settle and rise again as many as four or five times, within a distance of less than a hundred yards, and with apparently as much ease as on land. They all came direct in from the sea from a south-westerly direction, and seemed to aim for the entrance of the harbour between the piers, though there were plenty of them came on shore on each side of the piers. The shore was covered with a coarse sort of rye-grass, on which they were resting when we returned home, and in walking through the tall grass they rose in myriads." If *Napi*, *Rapæ*, and *Brassicæ* cross the Channel with so much ease, why not *Daplidice*?

59. Black-veined White (*Aporia Cratægi*).

59. Black-veined White.—All the wings are rounded, and the edges entire and without fringe; they are very sparingly clothed with scales, those of the females being semi-transparent; the colour is white, all the wing-rays in the male being black, but in the female the three principal wing-rays of the fore wings are pale brown; every wing-ray is accompanied by a vague triangular smoky cloud where it joins the hind-marginal ray.

Life History.—The eggs are laid in June, in clusters, on the white thorn (*Cratægus oxyacantha*); and the young caterpillars, which are hatched in ten, twelve, or fourteen days, are of a very social disposition; by their united exertions they construct a silken tent, under which they reside in quiet during the sunshiny hours, but issue forth morning and evening to feed on the leaves of the hawthorn. On the approach of winter they quit this nursery and build a more substantial one, which is apparently waterproof, and under which they pass the winter, huddled together in the closest proximity, and abstain entirely from food, like many of our hybernating caterpillars of moths; here they remain until the expansion of the leaves in the spring, when they emerge, wander about, and eat voraciously, yet even then for some time they return occasionally to the protection of their silken domicile, but very soon separate for ever, and pass the remainder of their caterpillar existence in comparative solitude. Towards the end of May they are full-grown, and then fall from their food-plant on the least annoyance, rolled in a tolerably compact ring, but with the head slightly on one side. The head is about equal in width to the second segment: the body is almost uniformly cylindrical, the second and thirteenth segments being slightly narrower than the rest; almost every part of the head and body is clothed with hair. The colour of the head and second segment is dull smoky black; the shorter hairs of the head are black, the longer ones white: the dorsal surface of the body is black, with two bright rust-coloured stripes, composed of minute rust-coloured spots, each of which has a central black dot which emits a rust-coloured hair; these stripes are interrupted at the incisions of the segments when the caterpillar is crawling, but appear continuous when it is at rest: the ventral surface is gray, this colour extending above the spiracles, which are black; the division of the dorsal and ventral surface is abrupt and decided; the gray area is sprinkled

with innumerable minute black dots, and emits a great number of feeble whitish hairs: the legs are black and the claspers gray. About the middle of May the caterpillar spins a milk-white web over the surface of the hawthorn twigs, and, affixing itself to this, prepares for changing to a chrysalis, a compound silken cord being first attached to the sides. The CHRYSALIS has the head obtusely pointed, the back of the thorax is sharply keeled, and the shoulders prominent; the body has also a dorsal keel, and on each side a lateral keel, but neither of them is so prominent as that of the thorax; and the body terminates in a curved and flattened horn, which is furnished at the extremity with the usual hooks. The prevailing colour is yellowish white, varied with pure yellow and spotted with black; the brighter yellow is principally observable in the more salient points, as of the head and shoulders, and the lateral and dorsal keels of the abdomen; but in these latter it is interrupted and incontinuous; the black forms a broad continuous stripe down the ventral surface, including the cases of the head, legs, and antennæ; the wing-cases are yellow, bordered and spotted with black; the dorsal keel of the thorax is black, and the abdomen is abundantly spotted with black; the anal horn is yellow, with three longitudinal black marks.—*Newman.*

TIME OF APPEARANCE.—June and July: in perfection about midsummer.

LOCALITIES.—I believe this butterfly is unknown in Ireland, Scotland, or the Isle of Man: the name appears in Mr. Greene's Irish list, on the authority of a Mr. Hely, but neither Mr. Greene nor Mr. Birchall appear to have seen Irish specimens. In England we have many recorded localities.

Berkshire. Burghfield, near Reading—*C. S. Bird.*

(Devonshire. Moreton—*Stainton's "Manual;"* not known now.)

(Dorsetshire. Glanville's Wootton, but I have not seen it for fifty-five years—*J. C. Dale.*)

(Glamorganshire. Formerly abundant, but I have not seen one for many years—*Evan John;* formerly abundant at Ynisygerwn, but not for many years—*J. T. D. Llewelyn.*)

Gloucestershire. Used to occur at Badgeworth—*Joseph Merrin;* near Bristol—*Alfred E. Hudd.*

Hampshire. Near Petersfield—*H. Harpur Crewe;* near Lyndhurst and Brockenhurst—*F. Bond;* Liphook—*C. G. Barrett;* New Forest—*J. C. Dale;* Southsea, Waltham—*Henry Moncreaff;* Emsworth—*W. H. Draper.*

Herefordshire. Formerly common at Eton Wood, near Leominster; I have seen it in cloudy weather settled almost by hundreds on the blossoms of the great moon-daisy (*Chrysanthemum leucanthemum*)—*E. Newman;* very rarely met with at Kimbolton—*Mrs. Hutchinson.*

Huntingdonshire. Monk's Wood on the 3rd of June—*H. Doubleday;* Monk's Wood—*F. Bond.*

Kent. Luddenham, Dimkirk, Shottenden, Selling—*H. A. Stowell;* most abundant at Herne Bay in 1858: we used, by way of amusement, to see how many we could catch at one stroke of the net; we often took four or five at a time: they appeared particularly fond of fields of broad beans—*H. Ramsay Cox;* local at Wingham; near Nonington, Sturry, uncertain in appearance—*W. O. Hammond;* in profusion at Strood—*Francis Latchmore;* Minster Lanes and Horne Park, near Ramsgate—*R. F. Turnbull.*

Monmouthshire. Common, its range extending from about a mile below Cardiff to a place called Llanwern, a distance of about fifteen miles—*George Lock.*

Northamptonshire. Barnwell Wold, and near Peterborough—*F. Bond;* near Towcester—*Hamlet Clark.*

Somersetshire. Clevedon, Worle—*Alfred E. Hudd.*

Sussex. At the Holmbush, between Henfield and Hurst; I have neither seen it nor heard of its being taken elsewhere in the county—*Edward Jenner.*

Wight, Isle of. Rare in the Isle of Wight—*F. Bond;* Quarr Copse—*Alfred Owen.*

Worcestershire. Great Malvern, scarce—*W. Edwards.*

2. CONCEALERS (in science Celantes),

Of which the caterpillars hide themselves in a silken follicle or cocoon before changing into chrysalids.

Turning back to page 18, it will be seen that I propose to divide all butterflies into two primary groups, which I call Exposers (*Detengentes*) and Concealers (*Celantes*): the former undergo their transformation to chrysalids in the most open and exposed situations, and quite uncovered; the latter undergo the change concealed in a cocoon, after the manner of moths. In Britain the Concealers are few in number, of small size, and of very insignificant appearance; they are universally known amongst us by the name of "Skippers." In all our arrangements of British insects these merry little creatures seem out of place; that is, there is no continuity in any series which combines the Exposers and the Concealers, and I am perfectly aware that this which I am proposing does not remedy the defect; but an attentive study of exotic forms will show that the gulf between the two groups is not so wide as it appears to us who are acquainted only with our Skippers. Between the Exposers and the Skippers intervene three beautiful and interesting families of butterflies, called in scientific nomenclature *Doritidæ*, *Uranidæ*, and *Synemonidæ;* they have all the general superficial appearance of Exposers, combined with all the natural and essential characters of Concealers. One of *Doritidæ*, called *Doritis Stubbendorffii*, so exactly resembles *Aporia Cratægi*, that it might easily be mistaken for that insect; another, of which a representation is given at p. 175, has frequently been described and figured as British; and although I am unable to refer to any British specimen, and therefore cannot include it in a British list, I think there is no improbability of its occurrence on the Scottish Alps, so similar in character to the Swiss Alps, where it abounds; but at present the evidence, as given hereafter, is insufficient for my own satisfaction.

Family 12.—Skippers (in science *Hesperidæ*).

The caterpillars are smooth, and have generally large heads and shuttle-shaped bodies; they feed on a variety of plants, but most frequently on leguminous species and grasses; when full fed they spin silken cocoons among the leaves or stalks of their food-plants, and in these turn into chrysalids which are without angles, more or less pointed at the head, and slender and tapering at the other extremity: they are very active, wriggling when annoyed with great vigour; some have a slight attachment by the tail, but none are suspended or girted. The butterfly has six perfect legs, all of them formed for walking: the fore wings, when the butterfly is at rest, are held in a semi-erect position; I have never seen them appressed back to back, as is usual in the more normal butterflies; the hind wings are held horizontally, or nearly so. The flight of Skippers is brisk and devoid of grace; it is rather more like the blundering flight of a full-bodied moth than the business-like progress made by a butterfly.

Obs.—Some entomologists prefer dividing this little group of butterflies into several genera or minor groups; but not being aware of the advantage of this subdivision, I have followed Herrich-Schæffer in keeping them together and calling them all *Hesperia*. It may, however, be observed that *Paniscus*, constituting the genus *Carterocephalus*, as well as *Sylvanus* and *Comma*—which, like so many exotic species, possess uncinate or hooked antennæ—offer noteworthy characters. The British species might, therefore, be divided without impropriety.

60. Grizzled Skipper.—The antennæ are slender at the base and gradually thickened to the tip, which is bent but not hooked; they are of a smoky black colour, annulated with

60. Grizzled Skipper (*Hesperia Malvæ*).

white: the outline of the wings is very simple: they are of a smoky black colour; the fore wings are adorned with variously-shaped white spots, the position of which will be seen in the figure; the hind wings have a compound white spot near the middle, and a transverse series of small white spots parallel with the hind margin: the fringe is spotted with black and white.

Scarce Grizzled Skipper (*Hesperia Lavateræ*).

Varieties.—There is a rather striking variety in which many of the spots on the wings are confluent, and are thus rendered much more conspicuous. Haworth has described this as the Scarce Grizzled Skipper (*Hesperia Lavateræ*). Intermediate specimens between this variety and the type are continually occurring.

Life History.—The egg is laid on the common bramble (*Rubus fruticosus*), and according to Hubner also on the raspberry (*Rubus idæus*). At page 149 of the second volume of the "Entomologist," Mr. Pristo informs us that in May, 1863, he found a pair *in cop.*, and put them in confinement; the female afterwards laid on the upper side of a bramble leaf, and also on the stems of the bramble, a number of small round eggs of a pale green colour, each egg being deposited singly. The caterpillar is represented by Hubner as drawing together the edges of the bramble leaf from the opposite sides, and thus forming a very exposed dwelling-place: the head is almost round, and wider than the second segment; it emits a number of short but very strong bristles, which give it a scabrous or rough appearance: the body is cylindrical, but tapers slightly towards both extremities; like the head, it is beset with hairs. The colour of the head is black, of the body either brown or green, having a rather narrow medio-dorsal stripe darker than the ground colour; besides this there is a triple side-stripe, the median portion of which is of the same tint as the medio-dorsal stripe, but the lateral portions are white. The chrysalis is rather long, smooth, and without angles or projections, but the last segment terminates in a straight horn directed backwards, and furnished with hooks at the top; the colour of the chrysalis is dull white spotted with black; the spots are arranged on the back in three longitudinal series, of which the medio-dorsal contains the largest and most conspicuous spots.

Time of Appearance.—May: it remains only a short time on the wing.

Localities.—Unknown in Ireland and the Isle of Man. It occurs in Scotland, but according to Dr. White not in Perthshire. In England I have found it in every locality I have visited.

61. Dingy Skipper (*Hesperia Tages*).

61. Dingy Skipper.—The antennæ are slender at the base, and are gradually thickened towards the tip, which is bent but not hooked; they are of a smoky-brown colour, delicately annulated with white: the outline of the wings is simple; their colour is dingy smoky-brown; the fore wings have an obliquely transverse gray band across the middle, between two darker ones; there is also a white spot on the costal margin at the commencement of the exterior dark band, and a series of seven or eight white spots on the hind margin, just within the fringe: the hind wings have several pale but obscure spots on the disk, and a series of small white spots on the margin; the fringe of all the wings is

smoky-brown, with a pale interval opposite each white spot in the hind margin.

Life History.—The eggs are laid in May on the bird's-foot trefoil (*Lotus corniculatus*); the caterpillar is figured by Hubner as of a pale green colour, and as having on the side two yellow stripes, each of which is surmounted with a series of black spots; the lower series appear to represent spiracles. The chrysalis is smooth, without angles, the thoracic segments being swollen and of a dark green colour; the body is tinged with rosy red; it is conical and pointed.

Time of Appearance.—May: it is particularly plentiful on flowery chalk banks in Kent, Surrey, and Sussex.

Localities.—Mr. Birchall mentions it as having been noticed in Galway, but it has not been recorded from the Isle of Man. Dr. Buchanan White reports it from Kirkcudbrightshire, Inverness-shire, and Ross-shire, but he does not mention it as inhabiting Perthshire. In England it occurs in every county list I have received.

62. Chequered Skipper (*Hesperia Paniscus*).

62. Chequered Skipper.—The antennæ are very slender at the base, and gradually but decidedly clubbed at the tip, which is not hooked; they are bright fulvous yellow beneath, and annulated with black and yellow above; the club is brilliantly yellow beneath: the costal margin of the fore wings is very straight and the tip pointed, but not acutely: the colour of all the wings is dark brown; the fore wings have about ten large and conspicuous yellow spots on the disk, besides a series of eight roundish and indistinct yellow spots parallel with the hind margin: the hind wings have three conspicuous yellow spots about the middle, forming something of a triangle, as well as a series of seven yellow spots parallel with the hind margin: the fringe is brown.

Life History.—Duponchel describes the caterpillar as brown with two yellow stripes down the back; the head is black, and the second segment bordered with yellow. It feeds on the broad-leaved plantain (*Plantago major*).

Time of Appearance.—June.

Localities.—I find no record of this little butterfly as an inhabitant of Ireland, Scotland, or the Isle of Man. In England it seems confined to a very few midland counties and one southern county.

Hampshire. Mr. Baker mentions this in Wise's "New Forest." I have not seen a specimen—*C. G. B. Corbin;* Southwick—*Henry Moncreaff;* I have this year taken *Hesperia Paniscus* at Netley Abbey, near Southampton—*Robert Harvey*, "*Intelligencer.*"

Huntingdonshire. Monkswood and other woods—*F. Bond;* Monkswood in profusion—*Henry Doubleday*, "*Entomologist,*" Vol. i., p. 156.

Lincolnshire. Bourne—*Stainton's "Manual."*

Northamptonshire. Castor Hanglands, near Peterborough—*F. Bond;* near Towcester—*Hamlet Clark;* in profusion in a wood near Oundle—*H. Doubleday;* not uncommon in the county; Barnwell and Ashton Wolds in May—*William Brec;* I have taken this insect very freely in the neighbourhood of Kettering—*W. Sturgess*, "*Intelligencer.*"

Nottinghamshire. It occurs in a wood near Newark; also in Ropsley Wood, near Grantham—*R. E. Brameld;* Stapleford, and near Newark, rare—*George Gascoyne.*

Oxfordshire. Wychwood Forest—*W. H. Draper.*

Suffolk. Stowmarket—*Stainton's "Manual."*

63. Large Skipper.—The antennæ are clubbed and hooked at the tip: the shaft is brown; the club brownish above and fulvous beneath: in the male, the basal half of the fore wings is fulvous, the outer half fulvous brown; but in the middle of the fulvous part is a raised and incrassated black line, which begins near the middle of the wing and ends near the hind margin; near the tip of the wing are six fulvous spots,

three of them near the costal margin, touching each other, or rather separated only by the darker wing-rays; all the wing-rays are dark brown: the hind wings are fulvous brown, with dark brown hind margins, dark brown rays, and about six not very distinct squarish

63. Large Skipper (*Hesperia Sylvanus*). Male and Female.

fulvous spots: all the wings have a fulvous gray fringe. The female has all the wings fulvous brown, with paler fulvous spots; all the hind margins are darker brown, and the fringes fulvous gray.

Life History. — Mr. Stainton, in his "Manual," quoting Professor Zeller, whose accuracy in observation is almost unequalled, says that the caterpillar has a brown head and a dull green body, with a darker dorsal line, dotted with black; beneath, on the tenth and eleventh segments, are snow-white transverse spots. It feeds on the meadow soft grass (*Holcus lanatus*), and on other grasses, in the beginning of May. I believe that I have several times found this caterpillar, and that it has a remarkably large brown head.

Time of Appearance.—May and August.

Localities.—Mr. Birchall gives the Murrough of Kildare as a locality for this butterfly, but no additional information as to its distribution in Ireland; Mr. Alfred Owen has taken it in the Isle of Man, and Dr. Buchanan White says it is indigenous to Scotland. The name occurs in every English county list I have received, except that from Northumberland; in those from southern counties the name is generally accompanied by some expression indicative of its abundance.

64. Silver-spotted Skipper (*Hesperia Comma*). Male and Female.

64. Silver-spotted Skipper.—The antennæ are clubbed and hooked at the tip. The upper side of the shaft is brown, the under side fulvous; the upper side of the club is black, the under side bright fulvous. In the male, the basal portion of the fore wings, extending two-thirds the length of the wing, is bright fulvous, and the outer, or hind-marginal third, dark brown; in the middle of the fulvous portion is a raised and incrassated slightly oblique black line, which commences near the middle of the wing and trends towards the base of the inner margin: in the brown or hind-marginal portion of the wing, and above the middle, are six pale yellowish spots; three of these, near the costal margin, are linear, crowded together, and only separated by the darker wing-rays: the hind wings are dark brown round the margin, paler in the middle, and having the paler portion spotted with fulvous. The female is more dingy than the male, the spots are less distinct, and the black line is altogether wanting. The under side of the fore wings is yellow towards the body and greenish towards the tip; at the very base are three broad dashes of black: the hind wings have a number of squarish spots of a silvery whiteness, whence the name of "Silver-spotted Skipper."

Life History.—The caterpillar feeds on the common bird's-foot (*Ornithopus perpusillus*),

bird's-foot trefoil (*Lotus corniculatus*), and other leguminous plants. It has a large black head and a cylindrical olive-green body, with a linear white spot on each side of the tenth and eleventh segments, very near the ventral surface.—*Hubner's figure.*

Time of Appearance.—July and August.

Localities.—Unknown in Ireland, the Isle of Man, or Scotland. It is by no means generally distributed in England, but is common in some localities, more particularly in chalk districts of the south and east.

Berkshire. Burghfield, near Reading—*C. S. Bird.*

Buckinghamshire. Aston Clinton—*H. H. Crewe;* Halton—*Joseph Greene.*

Cambridgeshire. Newmarket Heath—*F. Bond;* common in the chalk districts about Fulbourn and Newmarket—*Thomas Brown.*

Devonshire. Rare; I took one specimen in 1856 near Wimbury, along the embankment road; Plymouth, Exmouth — *J. J. Reading.*

Dorsetshire. Blandford Racecourse and Badbury Rings—*J. C. Dale.*

Gloucestershire. Rodborough Common, one specimen—*J. M. Musgrave.*

Hampshire. Portsdown — *W. Buckler;* Kimpton—*Rev. J. T. Rudd;* Petersfield—*Henry Monereaff;* Lyndhurst, in New Forest —*H. Ramsay Cox.*

Hertfordshire. Berkhampstead Common, one specimen—*G. H. Raynor.*

Kent. Boxley Hills, near Maidstone; not very common—*H. W. Greensted;* on the coast about Dover—*W. O. Hammond.*

Northamptonshire. Rare; in a rough field adjoining Bullnose Coppice, in August—*William Bree.*

Surrey. Croydon and Boxhill—*W. Machin;* on all the chalk downs in the Croydon district —*E. Newman.*

Sussex. Common on Malling Hill—*Edward Jenner;* Hollingbury Coombe—*W. Buckler;* very plentiful on the chalk, Bible Bottom; Cliff Hill is a favourite locality—*C. V. C. Levitt;* Brighton—*W. H. Draper.*

Wiltshire. One specimen near Martinsell, in 1865—*T. A. Preston.*

Yorkshire. Scarborough, York — *Edwin Birchall.*

65. Lulworth Skipper (*Hesperia Actæon*). Male and Female.

65. Lulworth Skipper.—The antennæ are slender at the base, and gradually clubbed but not hooked at the tip; they are brown above and gray beneath, slightly dotted or annulated with brown, the extremity of the club beneath being bright fulvous: the wings are dusky fulvous, with a narrow brown margin and a pale fringe: the male has an oblique and slightly raised but slender intensely black line, extending from the middle of the wing nearly to the inner margin at its base; and the female has nine rather pale fulvous spots near the middle of the fore wings, and arranged somewhat in the form of a crescent; this quasi-crescent opens towards the costal margin.

Life History.—At page 164 of the tenth volume of the "Intelligencer," Professor Zeller gives the following interesting particulars of this species:—"The caterpillar feeds in June on the wood small-reed (*Calamogrestis epigejos*), chiefly under the shade of fir trees; it makes deep notches on the edges of the leaves, which help to betray its proximity. It feeds in the evening and at night, resting in the daytime extended on the flat surface of a leaf. It is of the form usual in the genus, and it has also two snowy spots, as in the caterpillars of *Lincola* and *Sylvanus*. It is pale green, with a darker dorsal line edged with a yellowish line on each side, and enclosing a paler central line. Along the side is a narrow yellow line above and a broad one beneath; the two yellow lines on the back

are prolonged as far as the middle of the green head, and run to the end of the rounded anal shield, which is narrowly edged with yellow. Towards the end of June the caterpillar spins together two leaves with a few white silk threads, and becomes a slender agile CHRYSALIS, the peculiarities of which I had, however, no opportunity of observing. In a fortnight two males made their appearance."

TIME OF APPEARANCE.—July and August.

LOCALITIES.—Its range in the British Isles is more restricted than that of any other of our butterflies. It has never been observed in Ireland, Scotland, or the Isle of Man. In England it has only been recorded from three counties. We are indebted to the indefatigable Mr. Dale for the discovery of this insect at Lulworth Cove in August, 1832, as announced by Mr. Curtis in his "British Entomology," Fasc. 442. I believe it to be extremely local—that is, frequenting particular spots, but still abundant in those spots, scattered at intervals all along the sea-coasts of Devon and Dorset. In an extract given below Mr. Douglas treats of Lulworth Cove and the Burning Cliff as synonymous; but all my correspondents write of them as two localities. The Warwickshire localities, although confidently spoken of, are very unlooked for, and are, I think, fairly open to doubt.

Devonshire. Extremely local, frequenting cliffs and coves on the coasts, more especially cliffs east of Sidmouth and Torquay—*J. J. Reading;* Mr. Hellins has also taken it near Sidmouth.

Dorsetshire. Lulworth and Burning Cliff by Holworth—*J. C. Dale.* An hours' sail across Weymouth Bay, during which we amused ourselves with catching mackerel, brought us to the desired spot, the Burning Cliff (or Lulworth Cove), where we had been told we should find *Hesperia Actæon*, and there, sure enough, we saw it in profusion. The spot, close to the sea, is a kind of undercliff, not very level, of no great extent, and covered with thistles and large tufts of a long coarse grass or *Carex*, about which our prey were skipping briskly. So abundant were they that I often had five or six in my net at one stroke, and in about two hours I caught a hundred, filling my box and my hat, and Mr. Farr had nearly as many. They were accompanied by a few of the common *Hesperia Linea*, which in their flight they greatly resembled. My ungeological eyes detected nothing particular in the soil, and I confess that two hours' hard work in the sun had not disposed me to look if any particular plant which might serve as food for the caterpillars of this Skipper grew there; so that I can offer no supposition as to the cause of the species being confined within such narrow limits in this county—*J. W. Douglas, Stainton's "Manual."* *Hesperia Actæon* has been taken this year (1870) in two new localities in this neighbourhood, at Swanage and near Tyneham — *T. Parmiter*, "*Entomologist*," v. 179.

Warwickshire. Stratford-on-Avon—*W. G. Colbourne;* Mr. Humphreys states that he met with it in great abundance in 1835 at Shenstone, near Lichfield — *Stainton's "Manual."*

66. Small Skipper (*Hesperia Linea*). Male and Female.

66. SMALL SKIPPER.—The antennæ have a gradually thickened club, which is not hooked at the tip; they are brown, annulated with gray, and having a distinct fulvous tip. In both sexes all the wings are fulvous, with a black hind margin and wing-rays and a pale fringe: in the males there is a slender oblique black line extending from near the middle towards the base of the hind margin, which, however, it does not reach.

Life History.—The egg is laid on various grasses in July, and the young caterpillar probably hybernates when small; it has been found full grown and feeding on grass in the following June, when it is somewhat shuttle-shaped, gradually tapering, especially towards the posterior extremity: the head is of the same width as the second segment; the head and body are green, the latter having six slender white stripes: it spins a silken cocoon among the blades of grass, and therein turns to a green chrysalis, which has a pointed head-case, and is very sharply tapered towards the tail. It remains but a short time in the chrysalis state.

Time of Appearance.—July.

Localities. — Mr. Birchall took *Hesperia Linea* in Ireland at Powerscourt and near Cork, but did not observe it in the Isle of Man; and I have no record of its having been taken in Scotland. In England it is generally abundant, more particularly in the southern and midland counties, but has mysteriously disappeared from many places where it was formerly common; in Essex it occurs in open swampy places that are covered with rushes.

ERRATA.

Page 138, *line* 22, *for* May *read* July.

,, ,, ,, 17 *from the bottom, for* fine *read* first.

Page 158.—By an inadvertence the figure of the female *Daplidice* is placed above the male, contrary to the arrangement of the sexes I have adopted in other instances.

Doritis Apollo, frequently mentioned as British, but of which I know of no British specimen. (*See next page.*)

ADDENDUM.

The following notes respecting *Doritis Apollo* will be read with interest, but I cannot say that I consider them to warrant my placing this species in the British list.

I have recently heard that the *Papilio Apollo* of Linnæus has been found in Scotland, but I have not seen a British specimen—*Haworth*, "*Lepidoptera Britannica*," preface xxix. See also Haworth in "*Entomologieal Transactions*," vol. i., p. 232, and Donovan's "*British Inseets*," vol. xiii., p. 433.

I was informed by the late Sir William Hooker that in 1812, or about that date, *Apollo* is said to have occurred in the Island of Lewis, and was taken by a tenant of Lord Seaforth's, who had the specimen, but that there being at that time some communication between Norway and the Island of Lewis, the specimen might have come from Norway—*J. C. Dale.*

The late Mr. Haworth informed me that a lady, whom Mr. Curtis believed was the Marchioness of Bute, told him she had received a specimen from some alpine place on the West coast in the North of Scotland—*J. C. Dale.*

Mr. Curtis was convinced he saw a specimen of *Apollo* flying over the top of a house at the foot of Ben Lawers; and afterwards, on seeing this species on the Continent, he felt assured he was correct—*J. C. Dale.*

Mr. Wailes, of Newcastle, told me he had a correspondent in Lewis or Harris, from whom he had received many insects, especially *Carabus arvensis* and *C. clathratus*, who knew *Apollo* well, and said he had taken it; and he particularly described the red *ocelli*—*J. C. Dale.*

Mr. Floyer, M.P., told me he had seen a specimen of *Apollo* in Sir C. Trevellyan's cabinet—*J. C. Dale.*

Sir C. Lemon wrote to me that he had taken a specimen of *Apollo* in Cornwall, but suggested that it might have been imported with plants in his hothouse—*J. C. Dale.*

Obs.—Mr. Dale, who has so repeatedly assisted me during the progress of this work through the press, kindly sends me the preceding information, in accordance with my own request.

As you wish for more particulars about the capture of *Apollo*, I have been to-day to see the person who took it, and hear from his own lips all about it. He was lying on the cliffs at Dover, in the end of August or the beginning of September, 1847 or 1848 (he cannot remember which), when the butterfly settled close to him, and not having his nets, he captured it by putting his hat over it. He then carried it to his lodgings, shut the window and door, and let it go in the room and secured it. He had not the slightest idea what it was till he saw it figured in some work afterwards. The insect has all the appearance of having been taken as he describes; and as he has no object to deceive, and is a person in whom I can place implicit confidence, I have no doubt, in my own mind, that the specimen is a British one. It will probably be in my own collection before this letter reaches you, when I shall be most happy to show it to you at any time you are this way—*G. B. Wollaston*, "*Zoologist*" for 1856, p. 5001.

I beg to inform you that I yesterday met a gentleman who assured me that he saw *Apollo* at Hanwell about six years ago. He chased it, but without success. This gentleman's veracity may be relied on. At a time when *Apollo's* claim to be a British insect is under discussion, every scrap of information is of value—*Henry Austin*, in the "*Zoologist*" for 1856, p. 5109.

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